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Institute for Sustainable Futures

IMPLICATIONS OF POPULATION GROWTH IN AUSTRALIAN CITIES: CASE STUDY – LOWER HUNTER, NSW

2013

ABOUT THE AUTHORS

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Research team: A/Prof Michael Paddon, Ms Emma Partridge, Dr Samantha Sharpe, Mr Dustin Moore, Mr Nicholas Mikhailovich and Ms Katie Ross.

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INSTITUTE FOR SUSTAINABLE FUTURES
University of Technology, Sydney
PO Box 123
Broadway, NSW, 2007
www.isf.edu.au
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Case study summary

The Lower Hunter is located approximately 160 kilometres north of Sydney and, for this report, comprises five local government areas (LGAs): Cessnock, Lake Macquarie, Maitland, Newcastle and Port Stephens. With a 2011 population of 515,475, the Lower Hunter is the seventh-largest urban area in Australia. The region is a rich in resources and has historically relied on the mining, manufacturing and agriculture industries for economic and employment activity. However, in recent years there has been a strong shift towards the service sectors, such as tertiary education, health care, social assistance, accommodation and food services for employment.

In the past decade the Lower Hunter has experienced consistent population growth, growing at an average annual rate of 1.9 per cent. This growth is forecast to continue, with the city's population predicted to rise to 652,600 by 2031. Population growth has historically been concentrated in the coastal areas, particularly Newcastle, Lake Macquarie and Port Stephens. More recently the region has also seen strong residential growth in the Maitland area. The population is less ethnically diverse than Sydney or NSW. In the 2011 Census, only 15% of the Hunter's population was recorded a being born overseas.

The region's rural and semi-rural landscapes account for around 80 per cent of the region's land, and are characterised by the key industries of mining, wine production and tourism. The Lower Hunter region supports one of the largest river valley systems in eastern NSW and includes wetlands of international and national significance, including Ramsar-listed wetlands. Substantial parts of these lands have been protected as green corridors in new reserves created and managed under the *National Parks and Wildlife Act 1974* (NSW). Native vegetation also occurs on land selected for future urban development or employment land in the Lower Hunter Regional Strategy (LHRS).

The data analysis conducted for this case study suggests a number of implications of recent and future population growth in the Lower Hunter.

In terms of environmental data the findings are mixed. Regional air quality is good, and average annual water consumption per residential property has decreased over the past five years. However low-density suburban development, combined with very poor public transport infrastructure, means that the Lower Hunter is a highly car dependent region.

Concerns about pollution were one of the more common environmental themes to emerge during the interviews. A number of the participants discussed issues associated with fine dust particles in the atmosphere from coal mining and coal transportation while another discussed consequences of leaks, spills and atmospheric gas vent releases from industrial developments.

The social indicators show that the Lower Hunter is a relatively disadvantaged area. This is reflected in health data, which suggests that Lower Hunter residents have worse health status than New South Wales residents in general. The Lower Hunter has a comparatively high proportion of the population who are daily smokers (compared to Greater Sydney or New South Wales), or obese, and the percentage of the population reporting that their health is only 'fair' or 'poor' is higher than the equivalent percentage for Greater Sydney or NSW as a whole.

Educational attainment data is also consistent with the relatively disadvantaged nature of the area, with the Lower Hunter having significantly lower rates of bachelor's degree or higher qualifications compared to Greater Sydney and New South Wales. Unemployment is slightly lower than the Greater Sydney or NSW average, with the resources sector keeping the region at near full employment.

Many stakeholders pointed out the difficulties of meeting the varied needs of current and growing sectors of the population, such as community services for young families, the elderly, immigrants and refugees. Rates of mortgage stress are lower than those in Greater Sydney and New South Wales as a whole. Rates of rental stress are slightly higher than in Greater Sydney and New South Wales as a whole.

The Hunter region has worked to diversify its economy over the last decade. The Hunter region has a strong economy, with an estimated gross regional product (GRP) of $28.4 billion in 2006/07 or 8% of NSW gross domestic product (GDP). The region has experienced structural change in the past few decades, and has moved away from the dominance of primary and secondary resources (mining, agriculture and manufacturing) towards growth of the tertiary or services sector.

Stakeholders were concerned that existing and new developments will not achieve appropriate or positive levels of liveability. There were concerns about the lack of public transport, community fragmentation, increased car dependence and therefore traffic jams, lack of appropriate and affordable housing, and a serious deficit in access to medical services. There was a concern that the identity of the rural communities was decreasing with the changes related to population growth.

Stakeholders strongly suggested that there is a need for regional, integrated modelling of the impacts of land use development on a regional scale. Many believed that development had occurred in inappropriate areas, including environmentally sensitive greenfield sites or areas of high risk (due to likelihood of flooding or climate change-related impacts).

The challenges for the Lower Hunter area in managing the projected population growth will be to balance an increased number of dwellings and residents with the maintenance of the ‘rural’ character of the region, and to balance the heritage of the area in mining, manufacturing and agricultural production with emerging industries in health and community services, educational services and tourism. Stakeholders believed a major element of the challenge was developing and empowered regional institutions to deliver the planning, design and implementation of sustainable community-based development.

Glossary

ABS	Australian Bureau of Statistics
AWT	alternative waste technology
BOCSAR	NSW Bureau of Crime Statistics and Research
CBD	central business district
CD	collection district
CSG	coal seam gas
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EPBC Act	Environmental Protection and Biodiversity Conservation Act (Cth)
GDP	Gross Domestic Product
GRP	Gross Regional Product
HEZ	Hunter Economic Zone
HHCREMS	Central Coast Regional Environmental Management Strategy
IRSD	Index of Relative Socio-economic Disadvantage (a SEIFA index)
ISF	Institute for Sustainable Futures
kl	kilolitre
LGA	Local government area
LHRS	Lower Hunter Regional Strategy
ML	megalitre
NIEIR	National Institute of Economic and Industry Research
NEPM	National Environment Protection Measure
NSW	New South Wales
NO_2	nitrogen dioxide
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW Government)
RDA	Regional Development Australia
SAL	Statistical Area Level
SLA	statistical local area
SNR	statistically not reliable
SO_2	sulfur dioxide
SEIFA	Socio-Economic Indexes for Areas
SoR	State of the Regions
UTS	University of Technology, Sydney

Contents

Background and context

Geography and features

The Lower Hunter is a sub-region within the broader Hunter Region of New South Wales, Australia. It comprises five local government areas (LGAs): Cessnock, Lake Macquarie, Maitland, Newcastle and Port Stephens. It is located 160 kilometres north of Sydney and the area covers 4,291 square kilometres (0.5% of the total area of New South Wales). With a 2011 population of 515,475, the Lower Hunter is the seventh-largest urban area in Australia (RDA Hunter, 2012). The area is a major population centre. It includes Newcastle, the state's second-largest urban centre, and the major regional centres of Charleston, Glendale, Morisset, Maitland, Raymond Terrace and Cessnock..

The Lower Hunter area encompasses the regional city of Newcastle

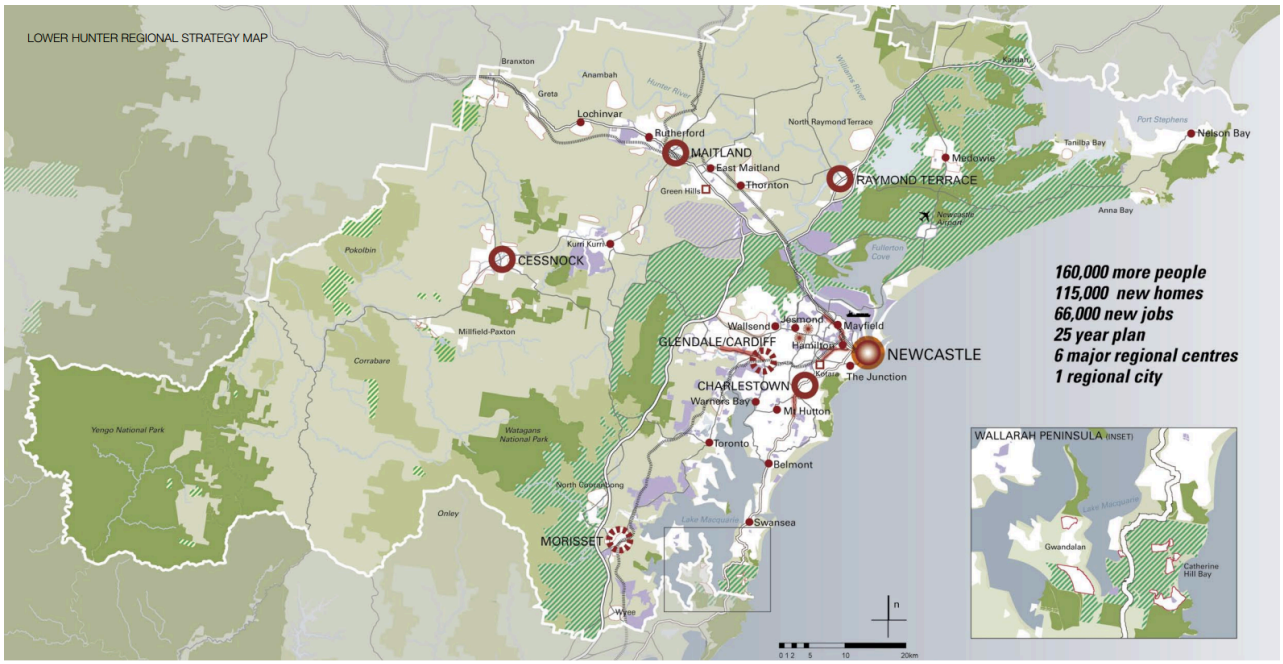

Figure 1: Map of Lower Hunter region (Source: Department of Planning, 2006)

The Lower Hunter includes the Port of Newcastle and the wide flood plain of the Hunter River. It is characterised by large areas of rural, agricultural and forested lands. Based on a major river and coastal estuary, it contains areas of high quality agricultural land, important drinking water aquifers and internationally and nationally significant environmental assets. The region's rural and semi-rural landscapes account for around 80 per cent of the region's land, and are themselves further characterised by the key industries of mining, wine production and tourism.

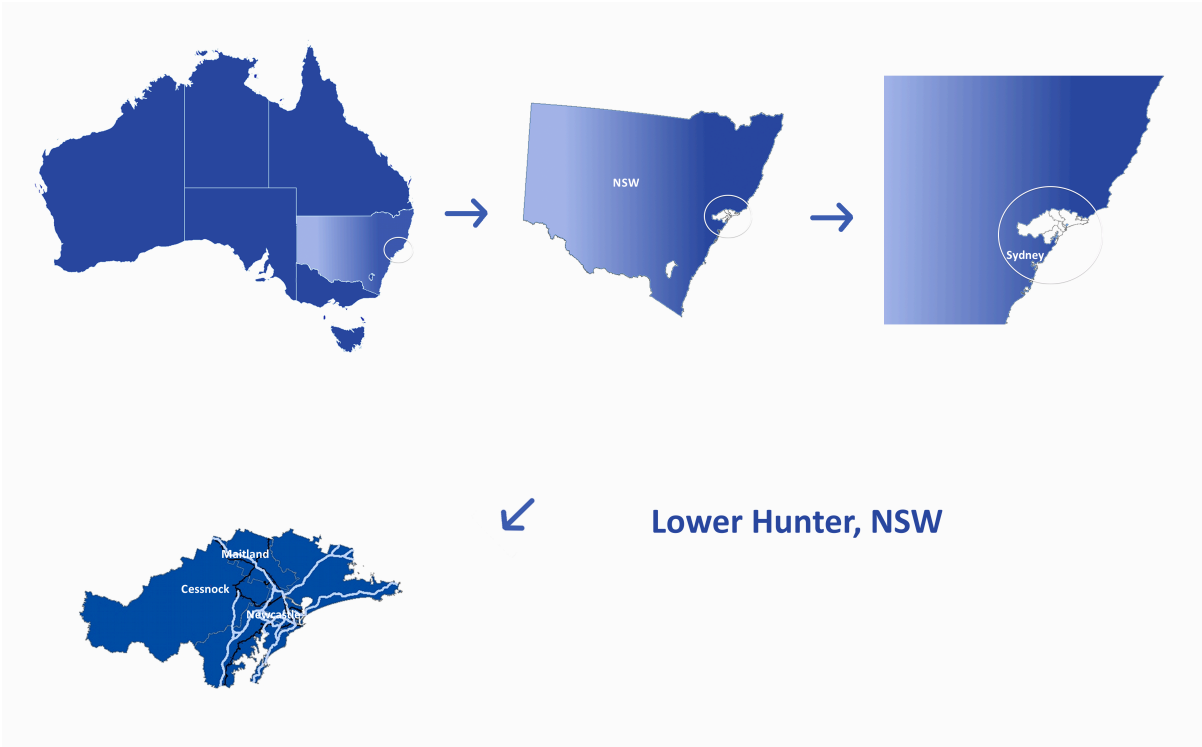

Figure 2: Geographical context map of Lower Hunter

Population summary

The estimated population of the Lower Hunter at 30 June 2011 was 540,002 persons,. In the past decade, the Lower Hunter has experienced rapid population growth. Between 2001 and 2011 the average annual population growth in the Lower Hunter was 1.9%, compared with 0.9% for New South Wales overall (see Table 1). The LGA with the highest average annual growth rate in the Lower Hunter between 2001 and 2011 was Maitland (4.7%), with Port Stephens the LGA with the next-highest growth rate (3.1%). The steady population growth recently experienced in the Lower Hunter is forecast to continue, with the region's population predicted to rise to 652,600 people by 2031 (DPI, 2010) (Figure 3).

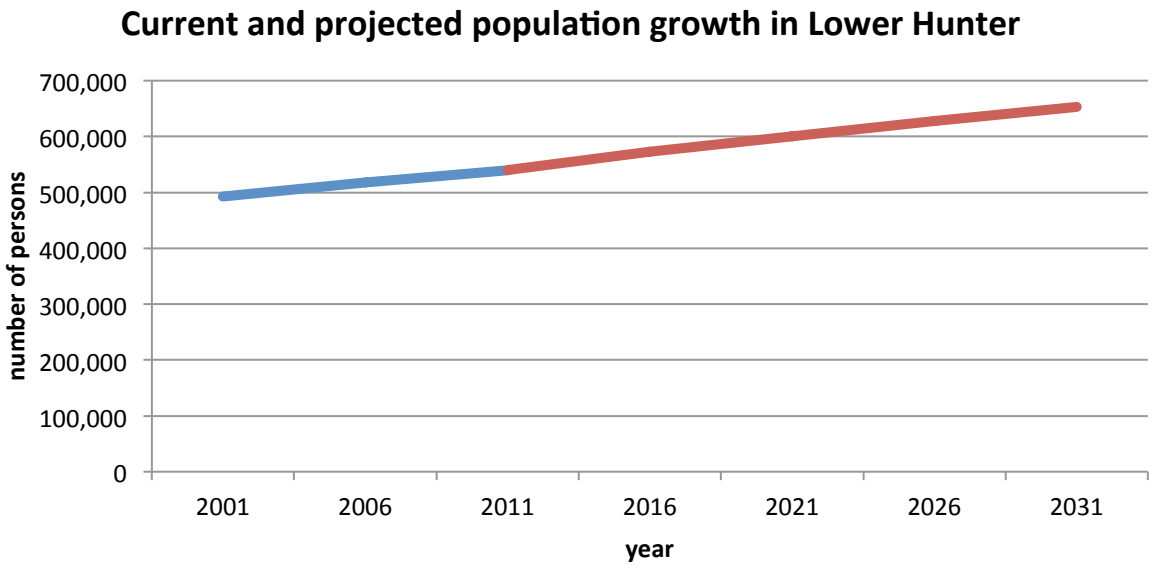

Figure 3: Current (blue) and projected (red) population growth in Lower Hunter (Source: DPI, 2010; ABS, 2012a).

Table 1: Context indicator – population (Source: ABS, 2012b)

	Lower Hunter 2001	Lower Hunter 2011	Greater Sydney 2011	NSW 2011
Population (persons)	492,549	540,002	4,605,992	7,211,468
Rate of growth 2001-2011 pa		1.9%	1.1%	0.9%
Population density (people/km^2)	114.8	125.8	372.4	9.0

Population growth has been concentrated in the coastal areas of the region, particularly Newcastle, Lake Macquarie and Port Stephens. However in recent years a reduction in the availability of new urban land in these areas, combined with the relative affordability of land further up the valley, has seen strong residential growth in the Maitland area (DPI, 2010). The growth of the Lower Hunter is projected to continue, with the NSW Department of Planning and Infrastructure (2012a) expecting Newcastle alone to accommodate up to 12,600 more residents and 10,000 extra workers by 2036. This is particularly because Newcastle has experienced a resurgence as a lifestyle city, with strong growth in residential apartment living. People generally however, move to the Lower Hunter because they are attracted by the region's combination of economic opportunity, affordability and lifestyle assets.

Social characteristics

Age profile

The median age of Lower Hunter (SA3) residents and Newcastle LGA residents is 37 years. This is slightly less than the median age of people in New South Wales as a whole, which is 38 years. As at June 2011, 21.3% of persons in the Lower Hunter (SA3) were aged 0 to 14 years and 13.4% were aged 65 years and over.

The most common family type in the area is 'couple with children' (43.5%), followed closely by 'couple with no children' (37.8%). One-parent families accounted for 16.9% of all families in the area.

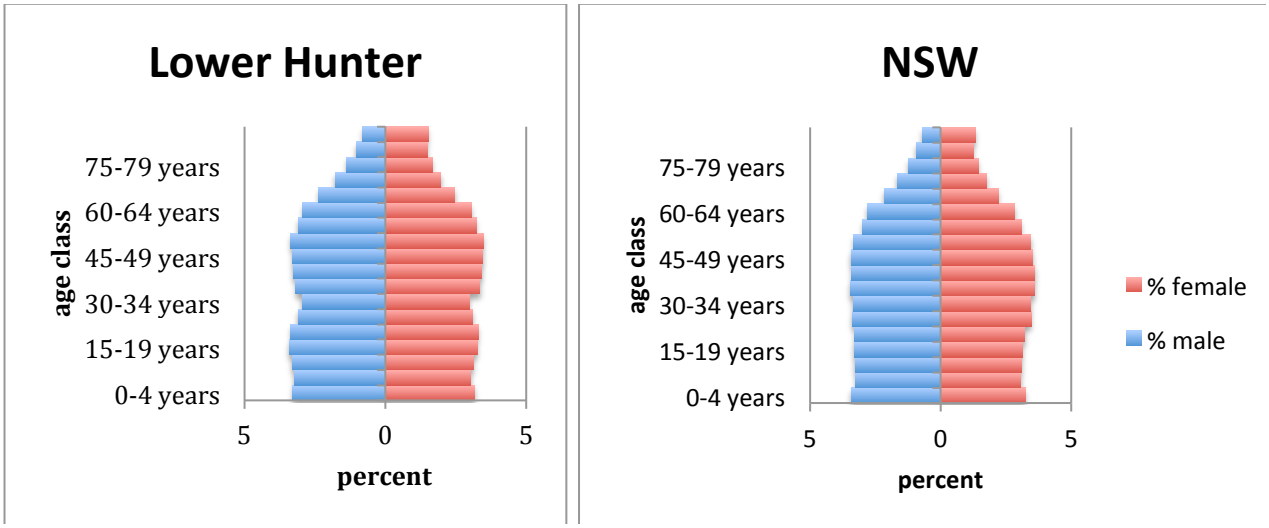

Figure 4: Age profile of Lower Hunter and NSW (2011) (Source: ABS, 2012)

Population diversity

Less than a quarter of the Lower Hunter's population (15.0%) (ABS, 2012) was born overseas and a very low proportion of residents does not speak English well (0.7% compared to 5.8% in Greater Sydney) (ABS, 2012) (Table 3). Of the total population, 5.1% were born overseas in predominantly English speaking countries and 5.0% were born in non-English speaking countries (Table 2). The proportion of the population born overseas is significantly lower than in Greater Sydney (34.4% born overseas) or NSW as a whole (25.7%).

At the time of the 2011 Census, Lower Hunter had 16,673 persons who stated they were of Aboriginal or Torres Strait Islander origin. Indigenous persons made up 3.2% of the total population (compared with 2.5% for New South Wales as a whole and 1.3% for Greater Sydney).

Table 2: Context indicator – cultural diversity (Source: ABS, 2012)

	Lower Hunter 2006	Lower Hunter 2011	Greater Sydney 2011	NSW 2011
Population (persons)	493,464	515,475	4,378,456	6,896,724
Indigenous	2.5%	3.2%	1.3%	2.5%
Overseas born from predominantly English speaking countries	4.9%	5.1%	7.9%	7.1%
Overseas born from non-English speaking countries	4.6%	5.0%	26.3%	18.6%
Total overseas born	15.3%	15.0%	34.3%	25.7%

Table 3: Context indicator – culture and migration (Source: ABS, 2007 & 2012)

	Lower Hunter 2001	Lower Hunter 2011	Greater Sydney 2011	NSW 2011
% Born overseas	15.3%	15.0%	34.3%	25.7%
% Do not speak English well	0.8%	0.7%	5.8%	3.9%
Indigenous	2.4%	3.2%	1.3%	2.5%

Economic characteristics

The Hunter region[1] as a whole is rich in resources including coal (the region has the world's largest coal exporting port), natural water resources, significant electricity generation capacity, and manufacturing. However, over the past few decades, the region has experienced a move away from the dominance of primary and secondary resources (mining, agriculture and manufacturing) towards growth of the tertiary or services sector. For example, while the main employment providers in Lower Hunter (SA3) are coal mining (12.3%), cafes, restaurants and takeaway food services (3.9%), school education (3.3%), accommodation (2.8%) and supermarket and grocery stores (2.6%), the main employment providers in the Newcastle LGA are hospitals (5.2%), cafes, restaurants and takeaway food services (5.0%), school education (4.7%), tertiary education (3.4%), and architectural, engineering and technical services (2.9%).

The Hunter region has a strong economy, with an estimated gross regional product (GRP) of $28.4 billion in 2006/07 (or 8% of NSW gross domestic product (GDP) (Wilkinson, 2011). Economic performance has improved during recent years with the abovementioned structural economic changes, which included significant job cuts in manufacturing (e.g. due to the closure of BHP's Newcastle steelworks), and a strong shift towards the tertiary sector (Hunter Valley Research Foundation, 2011). Other service sectors on the rise include health care, social assistance, accommodation and food services. More traditional areas of manufacturing and mining are also on the rise.

Planning and governance

Influence of the NSW State Government

The strategic planning of the Lower Hunter is primarily the responsibility of the state government. This includes the planning of major infrastructure projects, public transport, main roads, and traffic control. The Department of Premier and Cabinet, the Department of Planning and Infrastructure, and Transport for NSW hold the majority of the planning powers. The NSW Treasury has a role in funding.

Planning system in transition

The guiding document for the development of the Lower Hunter at the strategic level is the NSW Lower Hunter Regional Strategy 2006–31, which is currently undergoing review after its first five-year period (it is expected that the draft strategy will be exhibited in 2013).

The primary purpose of the Lower Hunter Regional Strategy is to ensure that 'adequate land is available and appropriately located to sustainably accommodate the projected housing and employment needs of the region's population over the next 25 years' by 'identifying future development areas, principal land use types, settlement patterns and conservation outcomes' (DPI, 2006: 1).

[1] The complete Hunter region (Upper and Lower Hunter) has been used for productivity, as the two sub-regions are highly, economically integrated and therefore data is difficult to find specifically for the Lower Hunter.

The first iteration of the Strategy plans and provides for 66,000 new jobs, 160,000 new residents, 115,000 additional dwellings, and the release of up to 69,000 new greenfield lots (NSW Department of Planning, 2006:10). According to the Strategy 60% of jobs will be located in the Newcastle central business district (CBD), other major regional centres and other specialised centres (40,000 jobs). Sixty per cent of new dwellings will be in new release areas and 40% are expected to be provided in existing urban areas (DPI, 2006:24). Five renewal corridors were identified to link strategic centres and transport routes, with the capacity to provide 4,000 dwellings.

The Lower Hunter Regional Conservation Plan is a partner document to the Lower Hunter Regional Strategy and is a 25-year program to 'direct and drive conservation planning and efforts in the Lower Hunter Valley'(DECCW, 2009: ix). In addition, the State Environmental Planning Policies (SEPP) cover matters that are significant to the state government. For example SEPP (Infrastructure) 2007 provides a consistent planning regime for infrastructure across NSW and would apply to the Lower Hunter. SEPPs may also be applied to specific areas within the state, such as SEPP (Urban Renewal) 2010, through which the Newcastle city centre is one of three precincts to be nominated for urban renewal (NSW Government, 2012:12).

The NSW Government is also conducting a major review of the *Environmental Planning and Assessment Act 1979* (NSW) the primary planning instrument in NSW. The review's Green Paper proposes a new planning system for NSW based on four principles: community participation, strategic focus, streamlined approval and provision of infrastructure (NSW Government, 2012b). The paper also suggests that community participation at the strategic planning stage will establish strategic directions for character, density and amenity, and therefore minimise the level of subsequent individual intervention in the development process. The Green Paper also discusses how infrastructure planning and delivery will be linked to development activity and proposes a wider base for the collection of contributions. Circulation of a White Paper in early 2013 is the next phase in the development of a new planning system.[2]

Newcastle Urban Renewal Strategy

The NSW Government has developed the Newcastle Urban Renewal Strategy, which 'proposes a framework for the city to successfully grow and identifies initiatives to improve the city's economy, access, connections and the quality and attractiveness of the public domain' (NSW Government, 2012: xvi). The strategy also supports the decision to replace the rail service from Wickham to the CBD with a bus service at Wickham (a controversial topic according to discussions with stakeholders).

Influence of local government

In NSW, it is primarily local governments that have responsibility for development assessment and local strategic planning, except where proposals are deemed to be of 'state significance'. The five local government areas comprising the Lower Hunter (Newcastle, Maitland, Cessnock, Lake Macquarie and Port Stevens) have planning control over the majority of their areas.

Under NSW Local Government legislation the local governments are required to produce a long-term community-based strategic plan, setting out its social, economic, and environmental objectives and how it will measure progress towards meeting them, as well as its overall long-term approach to civic leadership. Council is also required to report annually, and for the term of each elected council (four years), on progress towards meeting its objectives. NSW local governments implement planning frameworks through tools such as Local Environmental Plans, Development Control Plans, Civic Improvement Plans and contribution plans.

[2] See NSW Planning and Infrastructure: A New Planning System for NSW: http://www.planning.nsw.gov.au/a-new-planning-system-for-nsw

Other relevant institutions

The five councils of the Lower Hunter are part of the Hunter Councils organisation, a group of eleven councils of the Hunter Valley that have partnered to ensure collaboration and efficiencies, with strategic support divisions in the areas of the environment, legal services and training.[3]

Regional planning initiatives of the federal government

The Australian Government's Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) entered into an agreement with the NSW Government in 2012 to undertake 'regional sustainability planning and a collaborative strategic assessment of the Lower Hunter region of NSW' in accordance with the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).[4] The strategic assessment will assess, environmental, social and economic sustainability issues within the five local government areas (Newcastle, Maitland, Cessnock, Lake Macquarie, and Port Stephens). It is intended that the strategic assessment will be approved under law, thereby protecting areas of national environmental significance, providing greater certainty for local communities and businesses, and streamlining environmental regulation.

The federal government's Regional Development Australia (RDA) initiative is a partnership between the three tiers of government and seeks to prepare regional development plans. The committee responsible for the development of the Hunter region's development plan is one of 55 committees across Australia charged with creating development plans.

The *Hunter Regional Plan 2012–2022,* which applies to 12 local government areas, identifies an 'imperative to continue to diversify the economic base' in light of the coal mining industry's dominant role in the region (RDA Hunter, 2012: 5). Other key issues include competition for land resources, water resources and the need to develop and maintain a skilled workforce. The key goals and priorities for the Hunter Regional Plan centre on industry and commercial transit connectivity, collaborative planning, and an expansion of the region's manufacturing and engineering resources (RDA Hunter, 2012: 6).

3 See Hunter Councils: www.huntercouncils.com.au/

[4] See the Department of Sustainability, Environment, Water, Populations and Communities: www.environment.gov.au/sustainability/regional-development/lower-hunter/index.html

Environmental, social and economic indicators

The first component of the case study research involved investigating data relating to the themes and indicators presented in the indicator framework. Results across the three sustainability domains specified in the framework (environmental, social and economic) are discussed here, using the indicators as headings. The availability of data at the local level varies greatly across the indicators, and this report therefore draws on the most appropriate data that could be identified to characterise local activity. Where comparative data (for example at the New South Wales level) was available and meaningful, this has been included. It should be noted that data which relates to the Lower Hunter sourced from the ABS is an amalgamation of data for the five local government areas commonly considered as the Lower Hunter, and is not Lower Hunter Statistical Area Level 3 (SA3) data, except where noted.

The analysis presented shows that population growth is impacting on all three domains. In the environmental domain, data and reports indicate that growth will affect vegetation communities and total kerbside domestic waste is increasing. Fluctuations in total water supply do not match the change in the population supplied with water, so conclusions cannot be made in this regard. However, trends indicate that average annual residential water consumption is decreasing. Ultimately, while some gaps do exist, it is clear that population growth has brought with it changes in land use and increased motor vehicle use, both of which have environmental implications.

The social indicators show that the Lower Hunter is a relatively disadvantaged area, but has some areas of socio-economic disadvantage. Educational attainment data is consistent with the relatively disadvantaged nature of the area, with the Lower Hunter having significantly lower rates of bachelor's degree or higher qualifications compared to Greater Sydney and New South Wales as a whole. Similarly, in line with expectations that socio-economic status is correlated with health status, many of the health indicators suggest that people in the Lower Hunter have worse health outcomes than those in Greater Sydney and New South Wales as a whole. Unemployment is slightly lower than the Greater Sydney and state average.

The Hunter region has diversified over the last decade and is considerably healthy. Overall household wealth has increased in recent years, although average dwelling prices in different areas show that there is a range of household income and wealth levels within the region. Data suggests that Lower Hunter mortgagees suffer slightly lower rates of mortgage stress than mortgagees in Greater Sydney and New South Wales as a whole. However, rates of rental stress are slightly higher than in Greater Sydney and the state as a whole. Public transport infrastructure is lacking or patchy in the Lower Hunter, a fact that is reflected in journey to work data that shows a heavy reliance on private vehicles, and a rate of public transport use that is lower than that for walking. The proportion of residents with broadband Internet connections is slightly lower than the capital city average, but higher than the state average.

Environmental indicators

Climate and atmosphere

The NSW Department of Environment and Heritage notes that the Lower Hunter region has a substantial industrial base, including primary metallurgical works, fertiliser manufacturing and coal-fired power generators. Emissions from a substantial motor vehicle fleet also contribute to pollution concentrations in the region (OEH, 2012).

As the population of the Lower Hunter region is more than 450,000, the population criterion in clause 14 of the National Environment Protection Measure (NEPM) requires at least two monitoring stations in the region. Intensive EPA monitoring in the region commenced in the early 1990s with the establishment of three monitoring stations. Table 4 summarises what each of the three monitoring stations monitors.

Table 4: Natural capital – climate and atmosphere (Source: OEH, 2013a)

Station	Year Est.	Ozone	Nitrogen Oxides	Particles as PM10		Carbon Monoxide	Sulfur Dioxide	Lead	Met.
				HiVol	TEOM				
Beresfield	1993	X	X	X	X	X	X		X
Newcastle	1992	X	X	X					X
Wallsend	1992	X	X		X		X		X

A recent report by the NSW Office of Environment and Heritage that assessed three detailed reports prepared by the NSW EPA indicates that air quality in the Lower Hunter is similar to the air quality in Sydney and the Illawarra. The Lower Hunter routinely meets the national ambient air quality standards and goals for ozone, carbon monoxide, sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) with exceedences generally related to high particle concentrations (PM_{10} and $PM_{2.5}$) from extreme events such as bushfires and dust storms (OEH, 2012). Table 5 summarises the number of days of exceedence for the various measures for the three air quality monitoring stations across the Lower Hunter for the fourth quarter of 2007.

Table 5: Natural capital – climate and atmosphere (Source: DECC, 2008)

	Newcastle	Beresfield	Wallsend
NO_2	-	0	0
O_3	0	0	0
SO_2	0	0	0
PM_{10}	0	1	0
CO	0	-	-

Ecosystems and biodiversity

The Lower Hunter region supports one of the largest river valley systems in eastern NSW and includes wetlands of international and national significance, including Ramsar-listed wetlands. The region is of biogeographic and scientific significance as it supports a transition between the northern and southern ecological communities, and the native vegetation provides habitat for a great diversity of wildlife including many threatened species. One reason for the richness found in the area is that the Lower Hunter is part of a transition zone for many plant and animal species between the sub-tropical influences of the north and the cooler conditions of the south. In order to understand the full extent of the region's biodiversity, the Hunter and Central Coast Regional Environmental Management Strategy (HHCREMS) Program has produced two large volumes of vegetation community profiles in the Hunter, Central Coast and Lower North Coast. Within the volumes, each vegetation community is described in detail, with a site distribution map, total number of sites for each vegetation community, total species in each vegetation community, minimum, maximum and average species counts and various other measures.

Water

Hunter Water is a state-owned corporation providing water and wastewater services to people in the Lower Hunter region. As of 2011 Hunter Water serviced 227,695 households in the five Lower Hunter local government areas of Cessnock, Lake Macquarie, Maitland, Newcastle, Port Stephens, as well as the Upper Hunter area of Dungog and '*small parts of Singleton'* (Figure 5).

Figure 5: Hunter Water area of operation (Source: Hunter Water, 2013)

Table 6 below presents a range of general water statistics from Hunter Water for the period between 2006 and 2011. Particularly relevant figures include the average water consumption per residential tenement (fluctuating between 194.60 and 174.80 kl/annum), as well as the total capacity of major sources (288,000 ML) compared to the total amount supplied from these sources across this period (fluctuating between 74,757 and 67,100 ML/annum). The table also indicates the percentage change between 2006 and 2011 for each measure. Interestingly, while the population supplied with water has increased by 7% over the timeframe, total supply of water from sources has decreased by 10% during the same time.

Table 6: Natural capital - water (Source: Hunter Water, 2011)

	2006–07	2007–08	2008–09	2009–10	2010–11	Percentage change 2006–2011
Population supplied with water	505,712	510,703	515,695	521,736	539,364	7%
Properties where water is available	244,442	228,312	231,266	233,509	236,369	-3%
Properties connected to water (metred)	216,189	220,597	222,454	224,845	227,695	5%
Capacity of major sources (ML)	288,000	288,000	288,000	288,000	288,000	0%
Total supply from sources (ML)	74,757	67,244	67,181	70,609	67,100	-10%
Average consumption per residential tenement (kl/annum)	194.60	177.40	179.60	183.80	174.80	-10%
5 year rolling average consumption	205.10	196.20	190.60	188.00	182.00	-11%

To further highlight the Hunter Water key measure of *average annual residential water consumption by property*, Figure 6 is shown below. The more extensive time series data from 2001–2010 reveals that annual water consumption per property has been following a slight downward trend over the period, and has dropped below 200 kL/property annually.

Figure 6: Average residential water consumption in kL/property (Source: Hunter Water, 2010)

Land

The NSW Government has identified important green corridors traversing the different landscapes of the Lower Hunter region (DECCW, 2009) and has identified mechanisms to protect these lands by incorporating substantial parts of these lands into new reserves created and managed under the *National Parks and Wildlife Act 1974* (NSW). The Lower Hunter Regional Conservation Plan shows the conservation status of vegetation communities within the region (Figure 7 indicates that reservation targets have not been met in much of the region[5]). The Lower Hunter Regional Conservation Strategy (LHRS) also estimates that there is up to 5,000 hectares of native vegetation within the future urban and future employment lands identified in the LHRS.

[5] It has been assumed for commentary that the yellow colour in the map represents 'Reservation target not met', as the legend and colours used in the map do not necessary match exactly.

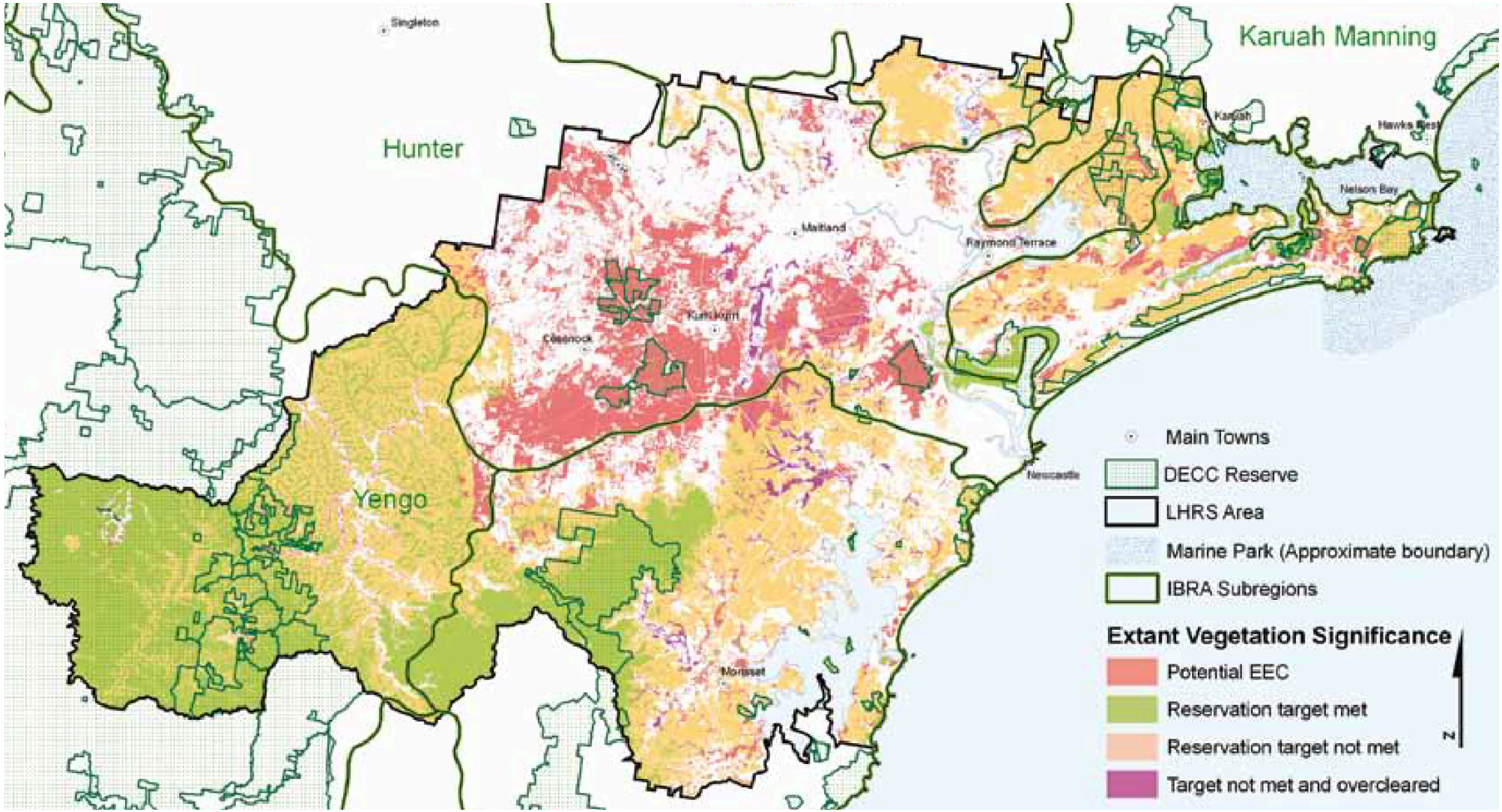

Figure 7: Conservation status of vegetation communities in the Lower Hunter Region (Source: DECCW, 2009: 14)

Waste

Data from the *NSW Local Government Waste & Resource Recovery Data* reports (2005–2010) indicate an increase in recycling (dry recyclables, garden organics and alternative waste technology (AWT) recovery) for both total domestic recovery and kerbside-only domestic recovery, with percentage changes of 2.7% and 27.3% respectively. Interestingly however, for total domestic recovery, total waste generation decreased (by 12.3%) from 2005–2010 but for kerbside-only domestic recovery, total waste generation increased (by 12.6%) for the same time period (OEH, 2013b). Table 7 summarises waste across the Lower Hunter region, amalgamating data for the five LGAs.

Table 7: Natural capital – waste (Source: OEH, 2013b)

		2005-06	2006-07	2007-08	2008-09	2009-10	% change 2005-10
Total domestic recovery (kerbside, clean up, dropoff)	Dry recyclables, garden organics and AWT recovery (tonnes)	78,041	72,790	77,637	82,115	80,178	2.7%
	Residual waste to landfill (tonnes)	226,820	238,491	199,925	188,009	187,131	-17.5%
	Total generation (tonnes)	304,861	311,281	277,563	270,124	267,308	-12.3%
	Total domestic recovery rate (%)	25.6%	23.4%	28.0%	30.4%	30.0%	
Domestic recovery (kerbside only)	Dry recyclables, garden organics and AWT recovery (tonnes)	47,093	47,593	62,574	62,308	59,968	27.3%
	Residual waste to landfill (tonnes)	141,973	148,120	151,871	151,049	152,909	7.7%
	Total generation (tonnes)	189,066	195,713	214,445	213,356	212,876	12.6%
	Total domestic kerbside recovery rate (%)	24.9%	24.3%	29.2%	29.2%	28.2%	

Table 8 aims to show the variations between the different LGAs' rates of waste recovery and total waste generation for the financial year 2010–11. As can be seem, Port Stephens has a significantly higher rate of recovery than all other LGAs and Maitland has the lowest rate of recovery.

Table 8: Natural capital – waste (Source: OEH, 2013b)

		Cessnock	Lake Macquarie	Maitland	Newcastle	Port Stephens
Total domestic recovery (kerbside, clean up, dropoff)	Dry recyclables, garden organics and AWT recovery (tonnes)	6,049	26,158	6,641	22,076	19,254
	Residual waste to landfill (tonnes)	21,994	69,905	33,174	49,531	12,527
	Total generation (tonnes)	28,043	96,063	39,814	71,607	31,781
	Total domestic recovery rate (%)	21.6%	27.2%	16.7%	30.8%	60.6%
Domestic recovery (kerbside only)	Dry recyclables, garden organics and AWT recovery (tonnes)	4,197	17,858	5,514	14,578	17,821
	Residual waste to landfill (tonnes)	15,466	59,020	21,431	46,016	10,976
	Total generation (tonnes)	19,663	76,878	26,945	60,594	28,796
	Total domestic kerbside recovery rate (%)	21.3%	23.2%	20.5%	24.1%	61.9%

Social indicators

Skills and education

There are a number of ways to assess educational attainment in populations. Common measures are the proportion of the adult population that has a bachelor's degree or higher, and the proportion that has a certificate or diploma qualification. On the former measure (adults with a bachelor's degrees or higher) the Lower Hunter has a significantly lower level of educational attainment than either Greater Sydney or NSW as a whole. However the data shows that Lower Hunter has a higher proportion of adults with certificate and diploma qualifications compared to the state and capital city averages. These results are shown in Figure 8 and Figure 9.

The proportion of adults with university qualifications in the Lower Hunter increased by 4.3 percentage points from 8.5% in 2001 to 12.9% in 2011. This is significantly less than the increase in the wider population, with university attainment increasing across Greater Sydney by 7.7 percentage points from 16.5% in 2001 to 24.2% in 2011, and across New South Wales from 13.6% in 2001 to 19.9% in 2011. These figures show that the increase in the proportion of the population with university qualifications has been much slower in the Lower Hunter than in Greater Sydney and NSW as a whole.

In terms of certificate and diploma level qualifications, attainment levels in the Lower Hunter changed significantly over the ten years between 2001 and 2011, from 24.2% of the adult population in 2001 to 28.7% in 2011. Levels of attainment for these qualifications grew less rapidly at the Greater Sydney level (22.2% in 2001 to 24.2% in 2011), and at the New South Wales level (22.7% in 2001 to 26.0% in 2011). At the New South Wales level, the proportion of the population holding these qualifications is around five percentage points lower than in the Lower Hunter.

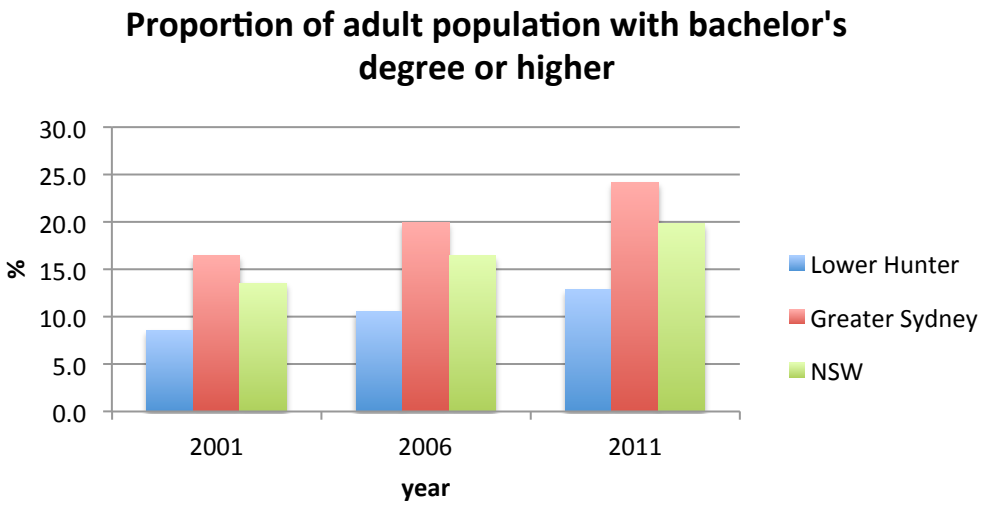

Figure 8: Comparison of adult population with bachelor's degree or higher qualifications (source: ABS, 2012b)

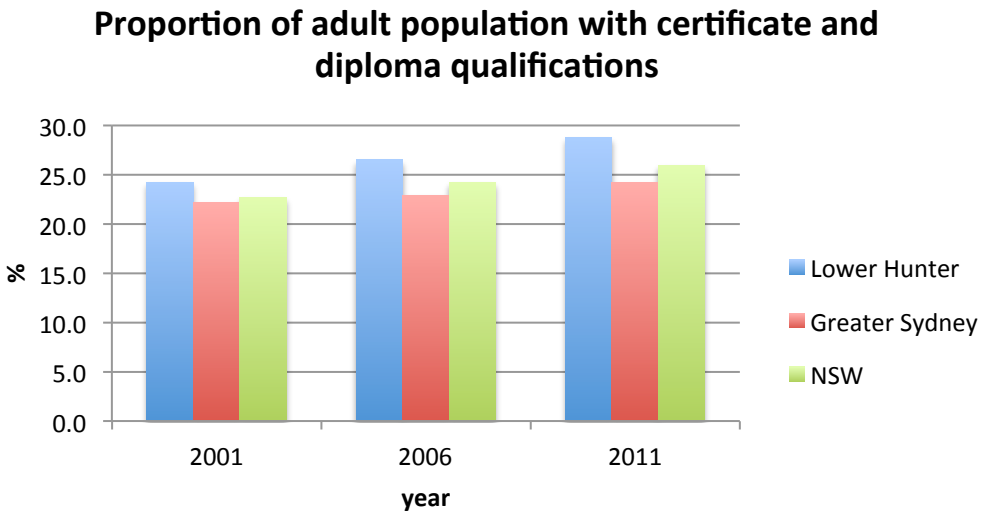

Figure 9: Comparison of adult population with certificate and diploma qualifications (Source: ABS, 2012b)

Health and socio-economic disadvantage

As research on the social determinants of health has shown, health outcomes are closely related to socio-economic status (World Health Organisation, 2012). Using the ABS Socio-economic Indexes for Areas (SEIFA), the Index of Relative Socio-economic Disadvantage (IRSD) scores for the five LGAs located within the Lower Hunter show that the area is significantly more disadvantaged than either Greater Sydney or New South Wales as a whole, but does contain some areas of socio-economic advantage. The Cessnock LGA was ranked in the second decile for disadvantage in New South Wales in 2006, whereas Newcastle was ranked in the sixth decile and Lake Macquarie, Maitland and Port Stephens were ranked in the seventh decile. Despite the generally disadvantaged nature of the area, SEIFA scores do show that there is variability within the LGA, with minimum census collection district (CD) score ranges for the five LGAs of 483–709 and maximums of 1127–1159.

Table 9: Social and human capital – disadvantage (Source: ABS, 2008)

	Cessnock	Lake Macquarie	Maitland	Newcastle	Port Stephens	Greater Sydney	NSW
SEIFA Index (IRSD) score	939	996	992	983	986	1020	1000
Minimum IRSD score of CDs	575	612	709	483	527	460	460
Maximum IRSD score of CDs	1149	1144	1127	1159	1114	1191	1191
Rank in NSW	30 (of 157 LGAs)	103	99	89	93		
Rank in Australia	176 (of 667 LGAs)	449	427	379	396		

While available data sources report health information at the whole-of-LGA level only, it is likely that the health status of the population in the Lower Hunter also contains levels of variability similar to those evidenced by the SEIFA scores discussed above. Overall however, the data indicates that the health of

Lower Hunter residents is not as good health as the rest of the state or region. The Lower Hunter has a comparatively high proportion of the population who are daily smokers (17.0% in Lower Hunter compared to 14.4% in Greater Sydney and 15.3% in New South Wales), and the percentage of the population rated as experiencing psychological distress[6] or reporting that their health is only 'fair' or 'poor' is higher in the Lower Hunter than in Greater Sydney or NSW as a whole (see Table 7). The incidence of obesity also appears to be slightly higher in the Lower Hunter than in Greater Sydney and New South Wales as a whole (see Table 7). However, as noted above, the aggregation of health data to the LGA level is likely to conceal higher concentrations of poor health status in specific areas of the Lower Hunter.

Table 10: Social and human capital – health (Source: PHIDU, 2010)

	Lower Hunter 2007	Greater Sydney 2007	NSW 2007
Proportion reporting fair to poor health	15.1%	11.4%	12.7%
Proportion of adults that are daily smokers	17.0%	14.4%	15.3%
Proportion of adults that are overweight or obese	39.0%	35.7%	37.0%
Proportion of adults rated as psychologically distressed[7]	10.0%	9.3%	9.3%

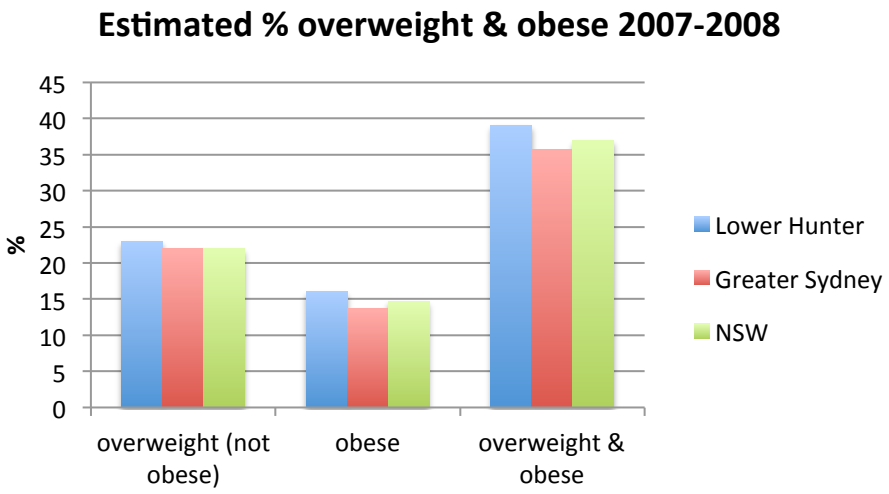

Figure 10: Comparison of estimated % overweight and obese (2007–08) (Source: PHIDU, 2010; ABS, 2009)

Employment and unemployment

For the 2011 Census, the unemployment rate in the Lower Hunter (Statistical Area Level 3) was lower in Greater Sydney and New South Wales as a whole. Table 11 below shows how the Lower Hunter compares to Greater Sydney and New South Wales for unemployment and how the DEEWR Newcastle region compares with the DEEWR Sydney Central region for hours worked per week and social security take-up.

[6] Percentages are of people experiencing high or very high levels of psychological distress on the Kessler 10 scale.

Table 11: Social and human capital – employment (Source: ABS, 2012; DEEWR, 2012; NIEIR, 2012) (Note: *data items marked with an asterisk use National Institute of Economic and Industry (NIEIR) data for the NSW Newcastle region, which covers the major town centres of Newcastle, Maitland, Charlestown and Pokolobin, and the The Sydney Central region for comparison, which comprises the Sydney CBD, North Sydney Botany, Top Ryde and Chatswood).

	Lower Hunter 2011	Greater Sydney 2011	NSW 2011
Unemployment rate	5.3%	5.7%	5.9%
Participation rate	59.4%	61.7%	59.6%
	NSW Newcastle	**Sydney Central**	
Hours worked per week*	24.0 hours (2012)	25.1 hours (2012)	
Social security take-up*	14.6% (2011)	5.9% (2012)	

A more detailed description of the current unemployment figures in the Lower Hunter can be found in Table 12. Data indicates that unemployment rates increased slightly across all statistical local areas (SLA) in the Lower Hunter between June 2011 and June 2012. The two SLAs with the highest percentage point changes between 2011 and 2012 (Newcastle – Inner City and Newcastle – Throsby) are both located within the Newcastle LGA.

Table 12: Social and human capital – employment (Source: DEEWR, 2012b)

Statistical Local Area	Unemployment rate (%) (September 2011)	Unemployment rate (%) (September 2012)	Percentage point change 2011 - 2012
Cessnock	6.4%	6.5%	0.1%
Lake Macquarie – East	4.3%	4.5%	0.2%
Lake Macquarie – North	3.4%	3.5%	0.1%
Lake Macquarie – West	5.2%	5.3%	0.1%
Maitland	4.2%	4.4%	0.2%
Newcastle – Inner City	5.2%	5.5%	0.3%
Newcastle – Outer West	4.2%	4.3%	0.1%
Newcastle – Throsby	4.3%	4.6%	0.3%
Port Stephens	5.1%	5.2%	0.1%

Security and crime

It is difficult to identify local level data on feelings of safety or security. Crime statistics provide some indication of the security or safety of an area, although it is well-documented that caution should be exercised when interpreting crime statistics, not least because they include only *reported* incidents.

The NSW Bureau of Crime Statistics and Research (BOCSAR) reports on reported violent and property offences by LGA. Table 13 is a breakdown of the violent and property offences by incidents per 100,000 head of population, with a comparison between the Lower Hunter, the remainder of the Hunter region and New South Wales as a whole. When compared to the incidence of crime across NSW, the data suggests that in 2010 the Lower Hunter had higher rates of crime in all but three offences (robbery, steal from person and fraud). The offences that are the most prominent in the Lower Hunter are 'assault – non-domestic violence', 'steal from motor vehicle' and 'malicious damage to property'.

Table 13: Social and human capital – crime and safety (Source: BOCSAR, 2010)

	Lower Hunter	Hunter Balance	NSW
Assault – domestic violence	362.1	428.8	359.5
Assault – non-domestic violence	622.2	540.9	535.9
Sexual offences	149.4	184.5	133.8
Robbery	50.8	23.1	74.7
Break and enter dwelling	599.0	599.7	569.9
Motor vehicle theft	385.3	279.8	280.0
Steal from motor vehicle	821.7	433.0	619.0
Steal from retail store	306.5	164.6	281.7
Steal from dwelling	373.5	468.6	288.3
Steal from person	87.6	41.9	121.9
Fraud	451.7	314.5	494.6
Malicious damage to property	1,633.0	1,570.4	1,260.9

Economic indicators

Wealth and housing affordability

Standard of living is usually measured by disposable household income, adjusted for household size and controlling for housing costs. Between 2001 and 2007 household disposable income across Australia grew on average by 3.1% a year, accelerated to 6.5% per year during the global financial crisis (2008–2009) and in the years since has dropped back to 1.6% (NIEIR, 2012). In the Newcastle region (which includes Newcastle, Maitland, Charlestown and Pokolobin) disposable income grew by 21.2% in the period from 2007 to 2012, which equates to an annualised figure of 4.2% (NIEIR, 2012).

Household wealth can be calculated as the value of dwellings owned by residents, plus holdings in financial assets, less the stock of household liabilities (NIEIR, 2012). As Table 14 shows, household wealth in the region has increased over the last decade, with most of this increase attributable to increased property values. Household debt service ratios and the ratio of debt to income have also increased. The average house and units prices in the Lower Hunter by LGA in the 12 months to November 2012 can be seen in Table 15. Average prices for houses and units vary greatly within the Lower Hunter, with Cessnock having significantly lower averages than the state as a whole. However, the figures for Newcastle LGA, which had the highest average prices of the region, are still much lower than the state averages (Australian Property Monitors, 2013).

Table 14: Economic capital – wealth and housing affordability (Source: NIEIR, 2012) (Note: NIEIR data is for NSW Newcastle region, which comprises the major centres of Newcastle, Maitland, Charlestown and Pokolobin; *represents growth in chain volume measures using ABS methodology)

	NSW Newcastle 2001	NSW Newcastle 2011
Wealth per household*	$371,000	$505,000
Household debt service ratio	13%	17%
Household debt to gross income ratio	0.99	1.33
Average dwelling price	$192,000	$333,600
Average dwelling price to household disposable income	2.6	3.3

Table 15: Economic capital – wealth and housing affordability (Source: Australian Property Monitors, 2013)

	Median house price	Median unit price
Cessnock LGA	$270,400	$243,000
Lake Macquarie LGA	SNR[8]	SNR
Maitland LGA	$360,000	$270,00
Newcastle LGA	$385,000	$349,000
Port Stephens LGA	SNR	SNR
NSW State	$447,000	$450,00

Mortgage or rental stress is another useful measure of housing affordability. It measures the proportion of low income households (those in the bottom two percentiles of household income) spending 30% or more of their income on housing costs. In Lower Hunter, 8.0% of low income mortgaged owner-occupiers and 29.7% of low income private renters can be classified as being in mortgage or rental stress. These rates put the Lower Hunter below the Greater Sydney and New South Wales levels for mortgage stress, and above the Greater Sydney and New South Wales levels for rental stress.

[8] SNR – statistically not reliable

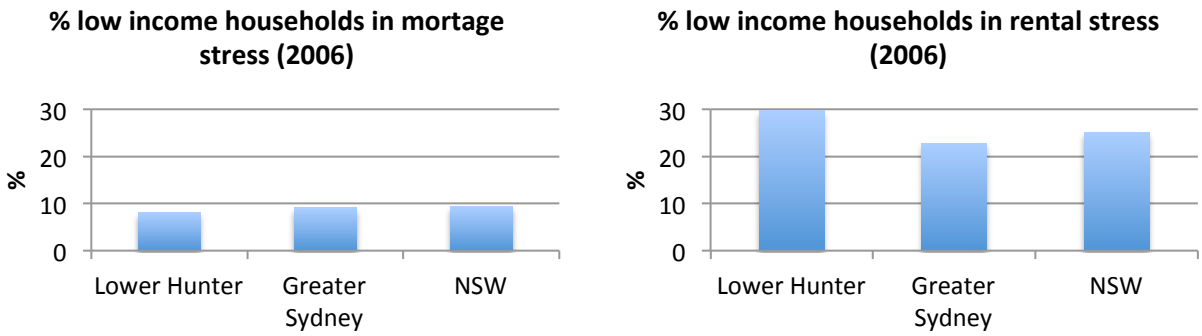

Figure 11: Comparison of % of low income households in mortgage or rental stress (2006) (Source: PHIDU, 2010)

Transport and infrastructure

Analysis from the 2011 Census on the journey to work patterns of Lower Hunter residents and workers shows that the majority of journeys to work were made in a car as the driver (67.4% for Lower Hunter Statistical Area Level (SAL) 3 and 65.4% for Newcastle LGA), with only 0.9% (Lower Hunter SA3) and 4.0% (Newcastle LGA) of people travelling to work by public transport. The second-most common method of travelling to work was in a car as a passenger (ABS, 2012) (see Table 16). In comparison to Greater Sydney and New South Wales as a whole, ABS data suggests that Lower Hunter residents and workers are much more reliant on their cars than are residents of Greater Sydney or the state as a whole, and a significantly smaller proportion of Lower Hunter residents use public transport.

Table 16: Economic capital – transport (Source: ABS, 2012)

	Lower Hunter SA3 (excl. Newcastle)	Newcastle LGA	Greater Sydney	NSW
Car as driver	67.4%	65.4%	53.7%	57.6%
Car as passenger	6.1%	5.5%	4.5%	5.0%
Public transport	0.9%	4.0%	20.0%	13.8%
Walking	2.8%	3.9%	4.1%	4.1%

Access to broadband Internet connections is a common measure of communications infrastructure. In Australia as a whole, the uptake of broadband services increased rapidly between the 2006 and 2011 census periods. In 2011, 73.3% of Lower Hunter residents had access to a broadband Internet connection, an increase from 35.8% in 2006 (a 37.4 percentage point change). The rate of uptake was faster than in Greater Sydney and New South Wales as a whole (a 26.1 percentage point change and a 29.3 percentage point change respectively) as shown Figure 10.

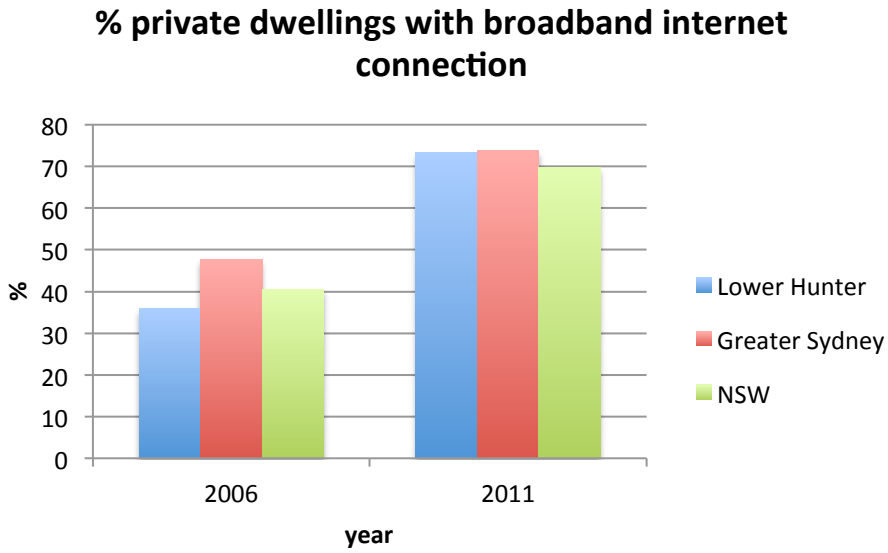

Figure 12: Comparison of broadband internet connection (2006 & 2011) (Source: ABS, 2007 & 2012a)

Productivity

The Hunter region[9] has a strong economy, with an estimated gross regional product (GRP) of $28.4 billion in 2006–07 (or 8% of NSW gross domestic product (GDP)) (Wilkinson, 2011). However, according to the Hunter Valley Research Foundation, reliable GRP data is difficult to obtain for the Hunter Region.

Business innovation

Local level business innovation data is virtually non-existent, unless it is collected through small, locally based surveys. Patent counts per population are often used as proxies for innovation, but these are often unsuitable, as patents are only used in certain types of innovation (technology-based and radical innovative activity), meaning this measure excludes other more common forms of innovative activity such as service or organisational innovation.

The NIEIR State of the Regions report does calculate patent applications per 100,000 population for the Newcastle region. NIEIR calculates that there were 14.89 patent applications per 100,000 population between 1994 and 2011. This compares with the Australian average of 21.01.

[9] The complete Hunter region (Upper Hunter and Lower Hunter) has been used for productivity, as the two sub-regions are highly, economically integrated and therefore data is difficult to find specifically for the Lower Hunter.

Stakeholders

A total of 18 stakeholders were identified from a process of stakeholder mapping. This list was refined and 13 stakeholders were invited to participate in an interview.

Stakeholder interviews were conducted from 4 to 7 December 2012. The list of stakeholders interviewed is shown below.

Table 17: List of stakeholders

Interviewee	Position	Role of organisation	Category
Roger Stephan	CEO, Hunter Councils	Regional organisation	All
Meredith Laing	Director, Environment Division Hunter Councils	Regional organisation	Environment
Wej Paradice	CEO, Hunter Valley Research Foundation	Local NGO	All
James Ryan	Member, Hunter Environment & Community Coalition	Local group	Environment, social
Kerry Hallett	Manager, Hunter Region Business Enterprise Centre Inc	Local group	Economic
Milly Licata	Project Manager, Hunter New England Health	State government	Social
Bob Hawes	General Manager, Hunter Development Corporation	State government	All
Natalie McCabe	Senior Strategic Planner, Lower Hunter Councils Transport Group	Local group	Social, Economic
Ken Freeston	Planning Engineer, Lower Hunter Councils Transport Group	Local group	Social, Economic
Scott Henderson	Planning Engineer, Lower Hunter Councils Transport Group	Local group	Social, Economic
Naomi Rees	Centre Manager, Maitland Neighborhood Centre	Local NGO	Social
Todd Williams	CEO, Hunter RDA	Regional organisation	Economic
Aaron Spadaro	Regional Liason Officer, NSW Department of Premier & Cabinet, Hunter Region	State government	All
Bill Tatnell	Senior Regional Coordinator, NSW Department of Premier & Cabinet, Hunter Region	State government	All
Colin Perry	Regional Liason Officer, NSW Department of Premier & Cabinet, Hunter Region	State government	All

Positive and negative views about population growth

At the beginning of each interview, stakeholders were asked to discuss their positive and negative views on population growth in the Lower Hunter region. Each participant listed a greater number of negatives associated with population growth for the region, as opposed to the brief amount of time that each stakeholder spent discussing the positives. This does not suggest that the stakeholders consider the positives that they outlined to be unimportant, however it is interesting to note that stakeholders were either more willing or able to discuss the negatives in far greater detail and, to varying degrees, struggled to explain how population growth is specifically benefiting the region.

This section of the report will briefly outline the positive and negative categorisations of population growth, with quotations from the interviews used throughout the text to further illustrate issues. Quotations are presented in *italics.*

Positives of population growth in the Lower Hunter

A number of contributors perceived population growth to align with economic growth, productivity and increased amenity.

> *'Population has an intrinsic link to productivity … The more people the more services you can get.'*

> *'Economic stimulus is seen as a positive. Councils think that the benefits of population growth are employment growth, business growth, a larger consumer market, and more of the lifestyle things that people want like lots of retail opportunities.'*

Three of the stakeholders believed the growing population supported a number of positive cultural shifts. The general view of these stakeholders was that larger numbers of people: (a) added some degree of greater cultural diversity to the region (b) led to a greater number of people seeking out cultural events, which (c) consequently led to the growth of artistic and community activities within the region and (d) led to shifts in people's attitudes towards acceptable levels of environmental degradation in some areas of the region.

> *'Newcastle is becoming an events hot spot and region-wide events are increasing. There are increasing pressures from the community to recognise this, pressure to have an art gallery that reflects the size of the community that we have here, for example.'*

> *'There is cultural growth happening here as the population shifts and changes.'*

> *'The population in Newcastle used to be built around BHP smoke stacks. However as this industry moved out there has been a general awareness of cultural change in the area. People from outside are moving in and not tolerating industrial damage.'*

Negatives of population growth in the Lower Hunter

Many participants did not ultimately view population growth as being negative, but rather believed that development has followed a characteristically unsustainable development path in recent times.

> *'Our concern is that we are creating suburbs without access to services. If you don't have access to education, work, connections to those things then can be very challenging. There is nothing sustainable about these new developments.'*

Stakeholders spoke of '*new subdivisions and developments occurring which seem to be just houses not connected to facilities or services, creating a very car dependent society where people are walking and biking less'* and felt in part this unsustainable development was due to the focus on greenfield and fringe development, with inadequate provision of services.

> *'People get obsessed with the house and land packages. The problem, in that sense, within the Lower Hunter Strategy is greenfield development. We are developing car dependent satellite cities with no prospect of a train line due to the coal trains taking up all the lines.'*

> *'Population growth in and of itself is not the problem. It's how we plan for it. More slum communities are going to form as people move to the fringes for the cheapest house and land packages.'*

One stakeholder mentioned that population growth per se is not the problem; rather, it is a question of absolute consumption: *'The problem with focusing on population growth is that the debate gets too focused on the number of people and not focused enough on the amount of consumption.'*

In terms of the negative categorisations conveyed by the stakeholders, firstly there was a general perception that population growth has increased pressure on infrastructure and services. This included in particular: transport infrastructure; housing affordability; and access to health services. Stakeholders believed these services are not sufficiently meeting the population's current needs and that the infrastructure and service delivery could worsen with population growth, especially in certain areas across the region.

> '*The negatives are that the infrastructure doesn't grow with the population, for example pressures include traffic jams and waiting for doctors.'*

> *'Housing affordability and supply is a growing issue … Just trying to get established as a young family will be difficult.'*

Alongside the general stress on infrastructure outlined above, a number of the participants also raised concerns that population growth in the region could contribute to more '*social dislocation'* issues.

> *'Population growth has led to significant social impacts associated with dislocation … People can miss out on some of the positive aspects of family life and a sense of being a part of a neighbourhood.'*

> *'Population growth and urban sprawl dislocates people. New communities don't necessarily have the sense of cohesiveness and belonging to be able to articulate the more subtle considerations that a community can have … When people have lived in an area they feel an attachment to it, you lose this with a new population, lose a sense of feeling for the place.'*

Another concern commonly raised by stakeholders was the negative affect that population growth has had on local biodiversity, due to a lack of information and accountability for conservation accompanying new developments (covered in more detail in the section below).

Several stakeholders also suggested that the new residential developments on greenfield sites also contribute to the conflicted debate about appropriate land use within the region and loss of identity.

> *'Development has taken away a lot of lush dairy land. There is a 5,000-house development at Thornton for example, on what has been previously grazing land. The landscape is changing and people are living on grazing land. In that way Maitland has a lot to lose of its rural culture.'*

The land use tensions that exist within the region are covered in greater detail in the sections below.

Environmental issues

Land use tension

The two most dominant environmental themes to emerge from the stakeholder interviews in the Lower Hunter region were land use tensions and biodiversity conservation. Land use tensions were the ones most commonly discussed, with every participant except one raising points that fall under this theme.

The issues discussed covered the ongoing tensions between the use of land in the region for: coal mining; coal seam gas extraction; industrial development; residential development; dairy farming; livestock grazing; wine production; and the equine industry. The state government has recognised this land tension for the Upper Hunter in the recently released Strategic Regional Land Use Plan, which seeks to balance agriculture and resources development (DPI, 2012).

Multiple perspectives emerged during the interviews, which shed light on this sustainability challenge from a number of different angles.

Firstly, the major land use types which were increasing in the region were seen to be coal mining, coal seam gas extraction, and residential developments. As a consequence, wine production, grazing lands, dairy farming, and the equine industry were seen to be either experiencing pressures or actually contracting in size and cultural influence.

> *'There has been a reduction in food production areas and this is a big concern ... A lot of our farms are being destroyed because of mining and the creation of mining communities is also impacting on our food basins.'*

> *'It used to be agriculture and wine grapes around here, but now coal and gas mining are even squeezing this out. There are farmers in the region who are even onside with the Greens now! Coal seam gas alongside coal exploration has now basically flagged the whole map for mining.'*

> *'This area used to be big on agriculture and dairy. Now it's is a feeder to industry. There has been massive growth in retail, small business and light industry. That has taken a lot of lush dairy land away.'*

Many of the stakeholders felt these land use issues were highly political.

> *'There is a huge tension between the employment sectors for the use of land. Wine production and the equine industry tend to be socially conservative industries, but it is now getting interesting because of the obvious conflict with mining. The politicians haven't worked out whose side they are on yet.'*

Industrial development within the Hunter Economic Zone (HEZ)[10] was also seen to be a controversial local political issue with an uncertain future at this point.

[10] The HEZ is a specifically zoned area for large industrial developments.

> *'There are now development applications in for 20 hectares of land, which is needed after we lost the other industrial jobs, yet the Greens have really tried to slow down the developments. But business can only wait so long … Developers of the HEZ are now pushing harder and will go to the state government if the council does do not meet their ultimatum. It's all about power plays now.'*

Some of the participants expressed views suggesting that a lack of strategic land use planning had occurred historically within the region, contributing to the present day tensions. The expansion of coal seam gas (CSG) extraction was said to be a present example of development occurring on a case-by-case basis, rather than under a regionally coordinated and negotiated strategy, and the stakeholders were divided on whether this is an appropriate strategy.

> *'There are no certain terms of reference for land use planning and high-level intervention by government would be helpful on this issue.'*

> *'The policy response is geared towards managing CSG development on a site-by-site, case-by-case basis. This allows individual proposals to be considered on their individual merit, taking a mixed-use policy towards land use rather than a view towards creating purist zones. This gives an opportunity for projects to be managed irrespective of where they come up.'*

A number of the participants felt that shortcomings of regional land use planning contribute to feelings of uncertainty among landholders on how land will be used or developed. Stakeholders felt that this landholder uncertainty then in turn contributes to ongoing conflicts between some stakeholder groups.

Retaining a sustainable land use mosaic will be a key challenge for the region as the population grows. A number of the participants did suggest that a more regionally coordinated land use strategy is now actively being worked towards, with one example given to illustrate this:

> *'Currently under development [by the Hunter Development Corporation] is a GIS-based infrastructure implementation-planning tool to time band areas for growth. It's basically a cost model (not a sensitivity model), identifying areas for growth in terms of capacity and cost to develop different sites … Hopefully this tool will inform the Lower Hunter Development Strategy.'*

Although a number of stakeholders made positive statements about the future of land use planning in the region with stated aims to pursue a regionally coordinated approach, achieving a sustainable land use mosaic in the longer term (alongside a reduction in the level of stakeholder conflict) was viewed by others participants to be a substantial challenge: '*Being able to have independent information to assess the impacts of development and the legislative capacity to back up decisions is what's needed. If there is no strategic direction it will end up being death by a thousand cuts*'.

The industrial and residential expansion occurring on greenfield sites within the Lower Hunter is reshaping both the physical and the social landscape, creating a shifting mosaic of lifestyles and livelihoods. As one stakeholder asked rhetorically however, '*What is going to be there after the mining ends?*'

Biodiversity conservation

Biodiversity conservation concerns were one of the most commonly discussed issues during the Lower Hunter stakeholder interviews. Participants predominantly focused on the extent to which industrial developments and residential developments (to service a growing population) were impacting upon local biodiversity. Developments occurring on greenfield sites were seen as the most common conservation concern, with the removal of native vegetation/habitat said to be occurring across a landscape that had already experienced significant habitat fragmentation due to the historic agricultural land clearing:

> *'The problem with the Lower Hunter Strategy is greenfield development, the concept of urban sprawl, where you have car dependent greenhouse intensive communities. Given what we know about the decline of nature, our woodlands and our threatened species, it's pretty damaging doing these developments.'*

In terms of 'offsetting' the impact of some of this greenfield development, one stakeholder in particular raised concerns about the effectiveness of the current policy as a conservation measure.

> *'There hasn't even been any mapping of offset sites as the population and industry has grown. With offsets there is always a reduction in the size of habitat overall in the region. Development should always go on already cleared land. The incentive should be for developers to buy pre-cleared land rather than simply offsetting. Covenants are only as good as the compliance that exists and if there are no public check-ups then the landholder won't comply.'*

As another stakeholder pointed out, 'offsets' predominantly fall outside of the reserve systems that are designed to secure biodiversity conservation requirements in perpetuity.

Alongside the direct loss of habitat associated with greenfield development, some of the participants also raised concerns about the biodiversity impacts of industrial and residential development occurring in close proximity to important native habitats. As one stakeholder explained, '*as the population spreads, natural areas such as state forests are also getting closer and closer to human populations and the buffer zones are reducing*'. Another further explained by giving a specific example: '*Kooragang Island is an internationally recognised bird-breeding site, yet it is located right next to the world's biggest coal loading port. Some land development has gone too far.*'

Historically, the region has also already experienced significant native habitat impacts with respect to the region's waterways. A number of the stakeholders discussed the historic impact of BHP's industrial discharge on the health of the region's rivers, lakes and harbour. Stakeholders explained that it has only been after significant remediation efforts in the wake of BHP leaving the area (and at a significant cost) that the health of the Hunter River and Lake Macquarie has now improved.

Finally, the common concerns about the region's biodiversity was matched by an equally common call for a more strategic land use planning approach to take conservation into greater consideration as development continues:

> *'In terms of conservation planning for the region, we are looking at a very large dark room with a small torch. We really lack an environmental conservation strategy for the region. We have ideas about stresses and endangered species, but this is often anecdotal; the problem has been that we haven't had good consistent information at a regional scale.'*

One stakeholder felt that part of the problem is tied to historical planning process.

> *'There's been a disconnect between environmental issues in the Lower Hunter and development planning. The Lower Hunter has the regional strategy and the green corridor conservation strategy, while in the Upper Hunter there was no conservation strategy at all. Part of this disconnect has come from a lack of leadership, where it has fallen back to the council to implement "conservation ideals".'*

To this end, some stakeholders were actively working to build a conservation knowledge base into Hunter Councils' integrated GIS mapping tool of conservation indicators for the region.

Pollutants

Pollution was one of the more common environmental problems discussed during the interviews. Firstly, a number of the participants discussed issues associated with fine dust particles in the atmosphere from both coal mining and coal transportation. The following is an indicative quote from one of the participants that conveys this concern about the Hunter Valley:

> *'Community groups are beginning to link the coal dust back to children's health and concerns about the extent of asthma and cancer. Mine Watch in Singleton has helped put data on the table and there is a population around Newcastle that is also really active about coal dust impacts and carbon emissions.'*

As another participant explained, '*the conflicts exist for example around freight corridors and towns, and schools in proximity to mining and transport activity*'. While these participants did not assert that a growing population is exacerbating the coal dust pollution, which is driven by industry, they did view it as being an important issue for the sustainability of the region, in terms of the need to work towards providing clean air for the community to breathe. Furthermore, as other stakeholders pointed out when discussing population growth and industry expansion, '*land use planning has meant that industry and people are coming closer together. The coal seam gas chemicals used are a concern, as well as the ongoing coal dust from trains and blasting*.'

Finally, one of the participants also raised the issue of the sporadic but consequential leaks, spills and atmospheric gas vents from industrial developments. To illustrate this point they drew on the example of Orica chemicals, which had a number of serious incidents occur at its facilities in 2011. These included, for example, a 20,000-litre ammonium nitrate leak at its Kooragang Island plant on Newcastle's northern fringe – an incident that occurred only a day after the plant was allowed to re-open after a previous leakage incident. The stakeholder pointed out the unknown impacts of these hazardous events on the health of the communities living in close proximity to these industrial sites, and on the quality of the environments that surround them.

Water security

Although it was not suggested that water supplies were currently under significant levels of stress in the Lower Hunter, several stakeholders recognised that population growth is known to increase the demand for water and for coal fired power, which depends on significant amounts of water. An integrated regional strategy was thought to be necessary to address future water security concerns as the population continues to grow. However, more than one participant suggested that under the current circumstances it would be challenging to make progress towards this outcome.

To begin with, the interdependence between the Upper and Lower Hunter regions was reinforced with the following participant noting the links between Lower Hunter communities and Upper Hunter water infrastructure:

> *'The Lower Hunter Water Plan is a good example of the links between the Lower and Upper Hunter regions. The reality is that there are elements of the water supply that are located in the Upper Hunter such as the Chichester and Lostock dams, which contribute significantly to the overall water supply benefiting the Lower Hunter region.'*

Alongside the fact that some of the water infrastructure supplying the Lower Hunter is currently located throughout the wider Hunter region (calling into question regional planning and governance boundary settings), another stakeholder pointed out that '*there are currently seven agencies that have control of water in the Hunter*'. Yet beyond the complex multi-agency/multi-regional context, a third aspect emerged from the interviews to further illuminate why these stakeholders believed that developing an integrated water security strategy would prove difficult:

> *'Water in general is an area of substantial debate and conflict in the region as demonstrated through the Tillegra Dam debacle [Tillegra was a controversial dam proposal[11]]. There is now an independent water advisory panel looking at drought management strategies rather than building more dams … Water security is a sleeper issue that could come back, and this issue is compounded by both population growth and climate change.'*

Because water security is a divisive issue in the wake of the Tillegra Dam controversy, it was suggested by a number of the stakeholders that politically speaking, water has come off the agenda for the time being. Yet as they also explained, implementing an integrated regional strategy for sustainable water management will ultimately be needed if the demand for water continues to increase over time.

Climate change

A number of the participants raised climate related concerns and linked these back to sustainability for the region. Beyond the challenge of water security as discussed in the section above, of particular note were other issues relating to coastal developments and seawater inundation.

[11] The Tillegra Dam was a controversial dam proposal within the Hunter region. The proposal announcement was not mentioned in the Hunter Water's Integrated Water Resource Plan or the 2006 State Plan. Conservationists argued that the dam would pose a significant threat to the Hunter estuary and wetlands due to a reduction of freshwater flows from the Williams River, and the commercial fishing industry would be affected as a result. On 28 November 2010 the NSW Premier announced the cancellation of the dam after the Planning Minister refused to approve it.

In relation to sea level rises and storm surges it was suggested that:

> *'Coastal development is currently still about managing risk rather than avoiding impact. We need to be more strategic about storm management in the planning approval process, however the state government is opposing these planning changes. The state government has basically said no to stopping houses being built on beachfronts, disagreeing with risk assessments.'*

Flooding

Concerns relating to the development of land that is susceptible to flooding around Maitland were raised by three of the stakeholders, with two in particular indicating their serious concerns for the sustainability of these developments. Firstly, it was explained that the Hunter region has a history of deadly flooding. After one particular flood, there was a meeting in Maitland where people '*realised that what happened in the Upper Hunter affects the Lower Hunter*' in terms of water the flows. Yet as the two concerned participants explained:

> *'Central Maitland is flood prone but they are expecting massive population growth to occur in this area. They are expecting to 'risk manage' this development, which equates to building houses that can withstand the high water mark.'*

Sustainable housing

Stakeholders also felt that the houses within the new developments were not being built according to sustainable building principles.

> *'I think that there is a pretty low awareness about sustainable housing within the region; developments are predominantly big boxes without eaves. Around the big growth area of Maitland it's all kit homes and air con units, with no real huge urgency from the community to look at sustainable house designs. There have been some small trials with smart metering, but the community is largely apathetic with respect to water security and sustainable design. It's only a niche market at the moment.'*

Social issues

The dominant social themes were issues such as education, health, unemployment, social cohesion, and the effectiveness of institutions and governance, as well as concerns for the liveability of the new development areas.

A point made by many of the stakeholders, preceding the discussion of social issues, is that there is great variety across the region, with diversity across the five local government areas and even between neighbourhoods.

> '*In terms of figures, it is important to tease out the differences within the region, as the average figures are only a midpoint and there are many examples of communities existing either side of the average*.'

Educational rates and services

Stakeholders raised issues within each level of the education system. One particular community was struggling with access to pre-schools: '*People struggle with getting the kids into pre-school. We have been running a playtime group and we are no longer funded to run it, and it's horrendous*.'

With regards to high school education, one stakeholder felt that '*school aspirations and completion rates are below the national average within the Hunter region*' and that in part this may be due to historical influences.

> '*Historically during the 1980s people could get mining jobs in the Upper Hunter and work for BHP steel in Newcastle. Teachers would say that kids leaving school in year 10 was not an issue because they all had jobs to go to. Both fathers and sons would work in trades and while this is still reflected in the present to some degree, it has changed somewhat over the last 10 years*.'

According to stakeholders, '*state planning is behind schedule about where they think schools should go*' and will struggle to keep up with increased demand resulting from population growth:

> '*They have plans for drawing in students from wider areas for bigger schools. Lochinvar is expected to grow from 1,000 to 20,000 people, but they are not expecting to build a school there*.'

Several stakeholders felt that the current level of TAFE provision in each local government area is unsustainable.

> *'Education is high on the agenda, there is a TAFE in virtually every LGA, but this situation is not really viable in a competitive market. A lot of people want courses offered at every campus but it's unaffordable to provide courses for welding in each location for example.*'

One stakeholder also felt there was an irony within the Lower Hunter of having a '*low education base but some of the best education facilities in the world*'. There was a sense of uncertainty as to whether the supply for schools and appropriate courses could keep up with the future and the changing demands resulting from population growth.

Health concerns

The prominent health issues raised by stakeholders related to the impacts of industrial pollution, drug use and mental health, although it was recognised that the diversity within the region meant that these issues may not be relevant for all areas and that not all health issues relevant to the Lower Hunter were raised.

As discussed above, certain areas in the Lower Hunter experience land tensions and '*conflicts exist for example around freight corridors and towns, and schools in proximity to mining and transport activity*.' The mining and transport activity is a concern and the health professionals '*certainly have an increase in dust complaints*.' The community has also raised concerns about increases in asthma and cancer due to close proximity to mining and industrial activities. The night-shift working schedules in the mining industry were also cited by a stakeholder as having negative impacts of family life in that family tensions and aggression was increasing with the rise in night-shift work.

In dealing with the health issues caused by mining and industry, several stakeholders felt that the goal should really be mitigation, which as described above, involves buffers between residential areas and industrials sites.

> '*We need to think about what the needs of the community are. Are there impacts because of coal and if so should coal pay for it? We really need to be focusing on mitigation*.'

Several areas within the Hunter are also seeing an increase in drug use, although the validity of drug use statistics was questioned. '*When our stats go up, is it that drug use is increasing or are people feeling more comfortable to come in and talk about things because of the more comfortable environment?*' Also, the drug '*that's on the streets changes*'. Currently, '*steroids, speed, ice, alcohol are huge*.' The number of bottle shops has also been noticeably increasing. The connection between alcohol and drug use was also drawn, which Newcastle has been trying to address by trialling bar access times.

It was also pointed out that drug use is not just an issue confined to lower socio-economic levels.

> '*Drug use is a funny thing because it is the low socio-economic people that are seen as the drug users. The people in the middle class have the life skills to handle their drug use in a way that is better perceived by society. You have to be careful how you represent that issue of drug use. People's perception of drug use is that it is about low socio-economic levels and [that perception] perpetuates the whole cycle*.'

Mental health is another issue that was recognised as involving all socio-economic levels in society, and for one community in particular was described as '*horrendous'* at the moment because of the increase in mental health issues and the simultaneous decrease in accessibility of health services.

> '*There is talk that a new Maitland hospital will be built and they are looking for land. The issue with mental health is horrendous at the moment. I hear of other community services who deal with mental health and this inability to access health services is an issue for them. They are doing quasi-mental health services and that is not right*.'

Mental health problems were also seen as being a consequence to social isolation. Stakeholders recognised that social isolation can be caused by many things like language barriers, socio-economic issues, car use problems and other '*various reasons'* that might be due to a region experiencing population growth.

The stakeholders expressed a general concern that with an increase in population growth, these health issues would increase with greater proximity to industry and this would increase the stress on medical services.

Access to health services and social services

Many stakeholders cited the difficulties in meeting the varied needs of the current and growing demographics. Difficulties included the provision of community services for young families and the aged, as well as multi-cultural, immigrant and refugee services.

Access to health services is a '*common issue in the Lower Hunter*'. Many stakeholders discussed the severity of this issue.

> '*The waiting lists at the hospitals are sky-rocketing. The doctors will talk about the terrific waiting lists to get into surgery*.'

As '*there are not enough GPs to service the population*', travelling to access health services is common. *'People are travelling to Cessnock, which is a half an hour up the road if you have a car*.' Seeing specialists is also difficult because *'most specialists are in Newcastle and some people here don't have money to pay transport to get down there.*' Not only can transport to health practitioners be a concern, but '*ironically one of the hardest places to park is at the hospital. There are shuttle buses taking people from staff parking at the football stadium to the hospital.'*

As alluded to above, accessibility can disproportionately impact at lower socio-economic levels. Stakeholders felt that '*accessibility is more of an issue than not having the services; how do you get there without a car?'* This distance and accessibility then *'becomes even more of a concern in the rural and remote areas'.* In addition to accessibility, '*there are not many GPs that bulk bill, so the low socio-economic people are stuffed*.'

Across the Lower Hunter there are '*pockets of real social disadvantage*' and the services to meet their needs are becoming overwhelmed. There were concerns that access to health services would only become worse with population growth and that infrastructure developments will not occur at a pace to match population growth.

Unemployment

Stakeholders had varying views on the extent of unemployment in the Lower Hunter. One stakeholder felt it *'is about the same as NSW'* while another believed *'our unemployment rates have reversed from being above to below state averages.'* The varying opinions may be due to the use of different definitions of the Lower Hunter boundary and to unemployment being '*an area-specific sort of problem'* as it '*reflects the availability of jobs in each area of the Lower Hunter*'.

> '*Kurrie and Cesscock have high unemployment, while Musslebrook has the lowest in the state … but this could change as smelters are closing and the slowing down puts a lot of pressure on the local people*.'

It was recognised that *'there is a whole unique set of challenges associated with Aboriginal employment.'*

> '*They are the some of the most over-qualified and under-employed people in the region as there is money for training, but that then doesn't lead to a job opportunity. We need to be investing in training opportunities with employment outcomes at the end of the training.*'

Another growing issue is around a lack of remuneration for child care givers. This issue stems from the increasing number of younger families moving to the area coupled with the need to commute out of the area to work each day.

> '*Both parents work because they have to pay off the mortgage … We see a significant number of grandparents who are raising the children or are secondary care givers, and they don't get any remuneration. So they are disadvantaged by looking after their grandchildren.*'

There was much discussion around the daily travel out of regional areas of the Lower Hunter for employment, both to Newcastle and to mines in the Upper Hunter. Stakeholders were concerned that as the population of the area grows, the locations of job development will not match the locations of residential developments.

Community fragmentation

There was a concern that the identity of the rural communities was decreasing with the changes related to population growth.

> *'The landscape is changing and ... the look of people has changed. In a small country town, people come in to buy some things in the town, and they don't get dressed up because they know people. [The farmers would come in with dirt on their hands], but now you see people dressed more professional or in smart casual.'*

Despite the changing identity of the communities, stakeholders felt that it is important for the rural community to maintain the '*rural mindset*' and the '*aspects that drew people to live in this area in the first place*'.

> *'This community is still a community and that's what it brings with it from the rural mindset, and this still permeates the urban mindset. Somewhere along the track that balance might change here.'*

While it was generally agreed that '*population growth has led to significant social impacts associated with dislocation*' several specific examples of community fragmentation were also provided in relation to increased car use, the design of developments, and impacts of the mining industry. Maitland was mentioned several times in particular as an area where more time is now spent in cars.

> '*Maitland has recently had high population growth, a big housing market, a younger family oriented community, where double income families often have one person working up the valley and one person often working down the valley, taking 30-45 minute commutes. Commute times for people working in Maitland have increased twofold over the last five years.*'

In relation to increased car use, one stakeholder mentioned a recent Department of Community Services study on liveable cities that explains how '*significant amounts of time spent commuting to work has a negative influence on family life and social cohesion as people miss out on positive aspects of family life and a sense of being a part of a neighbourhood*.' Another stakeholder concurred:

> *'Population growth has led to a breakdown in a sense of community within the region … especially due to people spending more and more time in the car. The new suburb Chisholm is a good example: 15,000 people are expected to move there without a shopping centre, as the old Thornton shopping centre developer has* [according to the stakeholder] *convinced the council not to approve a shopping centre development in the new area. This is all based on the assumption that people can drive to get where they want to go, but this leads to them being alienated from their local community.'*

An additional example of community fragmentation caused by poor design was related to unintentional impacts of community development.

> '*When the community housing department came in and built through the federal stimulus plan, they built dense housing … We have a whole group of low socio-economic people living in a dense area, which is creating some problems.'*

Stakeholders spoke about how the mining industry also has significant impacts on community cohesion for various reasons, and several believed that it is '*corrosive to a town*'.

> *'There are high levels of disposable incomes and increasing drug issues. Mining companies now want to plant thousands of demountable temporary accommodation down away from the regional towns, yet the towns still experience all of the impacts when the workers go into the towns on the weekend.'*

Designing for community cohesion and liveability was strongly advocated for by stakeholders, as the population of the region grows.

Design of development without services or liveability considerations

Stakeholders felt that traditionally there has been *'poor infrastructure planning, with previous planning that has not tied planning into social services*' and as touched on above, stakeholders were concerned about this same trend continuing in the design of new housing developments and its long-term impact on the community.

> '*There has been a significant increase in congestion and the infrastructure just hasn't kept up … The lag between growth and the service provision is really attributed to a whole series of things over time that are starting to catch up*.'

The community of Lochinvar was mentioned several times as an example of a community that may experience high-levels of growth and consequent demand for services.

There was a belief that the new developments are '*just houses not connected to facilities or services*' and that they are '*creating a very car dependent society*'. To improve the long-term sustainability of the developments and the wellbeing of the communities, several stakeholders were calling for more modelling tools to assess the sustainability of proposed developments in the planning stage.

As explained above, a Hunter Development Corporation's tool is under development to '*look at all of the potential impacts and opportunities associated with development in the Lower Hunter'* and to '*balance goals for development'*. Several stakeholders hoped this would lead to improved planning and design outcomes for the next version of the Lower Hunter Regional Strategy. This planning tool will hopefully be used to time band areas for growth. This tool focuses on larger-scale indicators such as '*how much it would cost to develop sewage and water infrastructures for green field sites, and ranking indicators it will give an overall colour to indicate whether a development should go ahead*'.

Another tool in the region, developed by Hunter New England Population Health, is aimed more at assessing the macro-level spatial planning and land use mix as well as the local level 'design, maintenance and use of buildings, availability of public spaces and transport networks, the design of street networks' as influences on health and wellbeing (Hunter New England Population Health, 2012).

Institutions and governance

A recurring theme throughout the stakeholder interviews was institutions and governance. Stakeholders provided several examples of inefficiency, particularly in relation to effective development and felt that some of the inefficiencies in the regional development are caused by the use of different definitions of the region.

> '*Some government departments view various parts of the region as metro and others regional. That classification from government is not that helpful really as it means that some parts of the region fit into some funding models and others don't*.'

The diversity among the regions creates challenges in creating a common vision or strategy. One stakeholder suggested local government amalgamation as a solution.

> '*The Hunter is basically a lot of small communities that have come together in a metropolitan area. We have tried to start the debate about five LGAs forming into one metropolitan area and we have been trying to do the big-picture planning vision for the future*.'

Others felt that a lack of functional planning was hindering the region's ability to develop sustainably. '*There are no certain terms of reference for land use planning, and high-level intervention by government would be helpful on this issue*.' Stakeholders felt that the plans now in development are not being integrated or developed collaboratively.

> '*None of them [various departmental plans] are integrated and there is very little awareness between departments of what others are focusing on*.'

Another stakeholder cited the process of investment justification as difficult in the current planning environment.

> '*It's a difficult planning environment because the economic rationalists want to calculate the benefit-cost ratio even for social things like parks that increase liveability but don't directly give an economic return on investment*.'

In terms of fairness of institutions and governance, several examples were provided which highlight a perceived lack of fair treatment.

> '*Being the baby sister of Sydney, the rhetoric is good now in terms of regionalisation and there is real policy happening around decentralisation of agency, but we are still trying to break through some aspects of how decisions and resources are dispersed in relation to Sydney.'*

> *'Hunter is looking after itself with some pretty severe issues that have been left unaddressed. The general population in the Hunter doesn't feel that they have been loved enough*.'

A lack of trust in state and local levels of government was evident, particularly in relation to '*corrupt*' partnerships.

> '*Population growth is used by property developers to say that we must have more housing developments; this is creating a spiral that is used to fulfil their own interests.*'

> '*There is nothing sustainable about these new developments. The state has the governance power to override council management guidelines. It's all just a deal with the boys unfortunately*.'

One stakeholder felt that the communities had been 'disenfranchised' from institutional and governance processes, which has led to a lack of confidence in engaging in governance discussions that affect their communities.

> **'***I find that people lack a lot of confidence to write a letter, whether that's in response to a development application, a senate inquiry about population growth, a newspaper, or to their local councillor.*'

Stakeholders repeatedly called for planning that is more integrated (across areas such as growth, water, transport, infrastructure and biodiversity), transparent, and evidence-based for the Lower Hunter.

Economic issues

In the main, stakeholders were positive about the potential for the Lower Hunter to expand and diversify its economy with the increase in population growth. Several issues were raised specifically in regards to the role of mining in the economy, CBD vacancy and revitalisation, developing alternative transport and the reliance on cars.

The role of mining in the economy

All stakeholders mentioned the mining industry during their interviews. There were conflicting views about the proportion of the economy represented by the mining industry, and about specific pros and cons of the mining industry in the economy. Several stakeholders believed that the region's economy was closely tied to the mining industry.

> '*Mining is important to the economy. If the mines closed a huge chunk of the people up here would be unemployed. Many people either don't work directly in the mines or have left and then work with the miners as contractors and the associated businesses*.'

Others felt the importance of mining is often exaggerated and that '*coal is not the main game*.' Several believed that in the Hunter the mining industry '*actually employs very few people even though it creates a lot of turnover*' and *'a lot of the money is actualised in the head offices in Melbourne or Brisbane*.' Others said there are a lot of service-based jobs in the Hunter Region. This perception that the importance of the mining industry was overstated was likened to the status the steel industry once had in the Lower Hunter.

> '*The former BHP steel-makers facilities were the biggest in Australia at one time. However BHP steel came and went, similarly I question how much are we really tied to the coal industry economically as the same thing that applied to BHP steel might apply to mining in the region. Maybe we have diversified more than we think?*'

Several of the specific issues associated with the mining industry, aside from the environmental and social issues discussed above, related to the loss of labour, the long-term impacts of the mining industry on other industries, the lack of infrastructure provided to the community by mining companies, and the secondary impacts of the fluctuating price of coal.

In regards to labour, it is challenging for some businesses to '*get experienced people as the mines offer a lot more money once people finish their trade'.* Many small businesses *'train up people only to lose them to the mines once they are certified*.'

> '*Other job sectors can't compete with the mines' demand for skilled labour. This is an issue for developing new industries for when the mining companies leave. The region is also not very good at developing non-retail jobs outside of the mining sector and retail jobs are dependent on disposable incomes from the coal-based employment.*'

As discussed in the environment section, before the mining began there was a large agricultural and dairy industry, but now '*a lot of it rides on the backs of coal.*' The growth of the mining industry is contributing to a '*huge tension between the employment sectors that use the land.*'

There was a common recognition that the region's '*proximity to the mine*' is a reason for increasing population growth in the small towns. To one stakeholder, it seems like '*every young man's dream is to drive the truck or the train for the mines and make a squillion dollars*'.

Another stakeholder felt '*there are some positive aspects of the relationship*' between communities and mining companies, but that the majority of mining companies '*feel that there are no direct obligations*' to the community. '*They might support the local sporting team but this is just the tip of the iceberg. They will leave the region as soon as the resource is gone, without developing in the region*.'

Due to the economic connections of the region to the coal industry, stakeholders explained how the fluctuating price of coal could impact the region, through job losses and housing investment decline and subsequent impacts on families, or conversely if the value increases the potential threat to future areas of development.

> *'Unfortunately what has happened in the last three months is that there have been major layoffs, because of the drop in the coal value.'*

Due to the broad range of impacts of mining on the economy, stakeholders were calling for greater economic diversification, especially as a population growth area.

Need for economic diversification

Many of the stakeholders would like to see a more diversified economy. It was recognised that with the boom in mining, other industries were decreasing, but stakeholders '*don't want to reduce the economic base towards focusing on only two or three things*.' The fluctuations in coal price and the finite amount of resource were two reasons cited for why the economy should be diversified.

Several stakeholders felt that preparing for a new economy is challenging, not only because of the loss of labour from other sectors to the mining industry, but also because of the challenges involved in balancing the need for immediate mining infrastructure as opposed to planning for future infrastructure.

> *'The main challenges include how to shift a coal-based economy to another form of economy … Our skills in the region can switch conceptually, the question is how can we do that?'*

While some stakeholders aren't sure how to achieve a more diversified economy, other stakeholders see evidence of this diversification already occurring. The difference in opinion is probably related to the varying locations of the stakeholders within the Lower Hunter region. Some stakeholders saw health, education and the creative industries as '*the drivers for the future*.' Interestingly, one stakeholder described the Hunter as '*the epicentre of the two speed economy – world leading clean energy and IT sector, world leading health research and tourism leader, yet struggling to get to its feet. It needs a kick to really get going to form a strong economic base*.'

One stakeholder questioned whether the new economy could be post-growth. '*In terms of sustainability, how can we have an economy that doesn't need constant growth to make people feel like they have security*?'

Opportunities for diversification

Stakeholders mentioned the opportunities in a variety of new sectors in the region, including health and health research, education, professional services, creative industries, value-added manufacturing, clean energy, call centres, tourism, digital business and defence. Many of these sectors are currently experiencing growth in specific areas in the Lower Hunter.

Stakeholders felt that the introduction of broadband, the history of innovation in the region, and the growing number of research facilities in close proximity to industry were all strengths to help grow and diversify the economy. The combination of proximity to Sydney and on-line industry was also seen as providing a significant opportunity:

> '*A lot of creative industry starting in terms of computing and co-location workspaces as it's easier and cheaper to live here than Sydney*.'

One stakeholder mentioned a recently commissioned economics study which modelled the economy for the region out to 2026 (the full report was not public at the time of this study). The study suggests that '*the classics will still remain strong, in terms of manufacturing and mining services*' in the Lower Hunter but that the education system will be the biggest employer. The report also suggests that '*what will change is highly skilled value added manufacturing industries*.'

Barriers to diversification

Several recurring themes related to the barriers to diversification included the failure to utilise existing infrastructure (which stakeholders related to government policy decisions), cultural acceptance of the new employment sectors, inappropriate training, and lag in necessary development.

> '*Government policy can also have a huge impact on the region's economic opportunities. We have a port here that's ready to go for whatever, with the port currently only partially utilised at this point in time, but it feels like the brakes are on.'*

Another stakeholder agreed that Newcastle has '*empty sheds with deep-water berths because politically we have decided to use Sydney ports, even though it's cheaper and easier through this harbour than Sydney*.'

There are also various cultural norms in the Lower Hunter that impact the spread and adoption of various new sectors. In more rural areas, the wine and tourism industries '*employ more people than anything else, but a traditional blue-collar region doesn't entirely accept these kinds of new economic development*'. One stakeholder felt that '*for many people cooking for someone is not seen as a proper job but smelting iron is*.'

The acceptance of digital technology also varies across the Lower Hunter. There is '*a lot of opportunity for digital business growth in Newcastle; cloud programs that have come up, Hunter Digital is a new IT growth promoter. One edge of the business community is diving towards the digital space while the other is yet to embrace it*.'

Also in terms of existing norms, the prominence of coal meant for one stakeholder a continued disadvantage for renewable energy.

> '*There is the clean energy hub, funded by the federal and state governments. The hub aims to look beyond fossil fuels. There are plans for a wind farm, research into solar and wave technology (although this is not unique to the region). We have a history of innovation in the region, but the politics of energy will need to change before renewable energy can be a serious option. We are not close enough to the end of coal yet in the Hunter to make the government or business change.*'

Aside from government policy and the dynamics of existing culture with new industry, a lack of skilled labour was '*a major constraint on growth for businesses during the last 10 years*.' Stakeholders felt that in addition to the skilled labour loss to mining, a lack of appropriate training exacerbated this issue, despite the presence of a TAFE in each LGA.

> '*The actual training of people once they have left school without their having to go to Sydney can be difficult. Some of the courses that they have offered at TAFE just aren't quite there in terms of where they need to be. One of the complaints is that it's just not quite the right for the real world.*'

Development constraints were also seen to hinder the economic growth of the area. '*We are hearing about a shortage of premium high quality office spaces, for example for financial services and insurance. This indicates a desire for further growth in these areas, however development constraints are currently holding them back*.' Local government was also mentioned in relation to development constraints. '*When you have business people walking away because of Cessnock and Port Stephens councils' refusal to advance DAs, that's a big issue because you have jobs walking away*.'

Stakeholders felt these barriers needed to be addressed in order to create a more resilient economy to meet the needs brought by population growth.

CDB vacancies and revitalisation

Stakeholders mentioned quite a few towns within the Lower Hunter that are striving to revitalise their CBDs and town centres. Population growth was seen both as a contributor to the decline of the CBD areas and as an opportunity to revitalise the CBDs. Maitland and Newcastle were two of the most frequently cited examples.

Maitland is '*quite a rapidly growing regional city.'* The council is '*aware of the need to drive change and improve the city*'. They are working to encourage more activity and more employment. At the request of the community, the local council is reopening an old mall in Maitland based on input and suggestions from the community, through the '*highly collaborative*' city council's development strategy.

In Newcastle, the demography of the CBD has changed as the suburbs spread and the new retail centres are built outside the CBD. What used to be a '*concentrated CBD retail sector is now dispersing*'. The developers in Newcastle '*are now siting populations and consumption markets together to the detriment to the city centre*.'

The Newcastle renewal plan is a planning strategy trying to renew the city centre.[12] Newcastle faces specific challenges in regards to revitalisation, including issues with mine subsidence and new developments, public transport, and potential major changes to transport in the CBD, all of which are '*reflective of changes coming from population change and pressures*'.

Several aspects of the Newcastle renewal plan are highly contentious, particularly with regards to the train line that runs from regional areas in the Lower Hunter into Newcastle. Stakeholders are divided on whether it will impact Newcastle and the regional areas positively or negatively.

> '*The decision has been made by the state government to stop the trains. There is quite an uproar in Maitland about that. There are lots of people who think that is going to have an incredible effect on Maitland.*'

The frustration felt by some stakeholders is that this decision was made without due diligence in data evaluation in the appropriate planning process.

> *' They have no qualms about making that decision about the train before a transport plan is created based on evidence … We need to work collaboratively with state and local government and communities [to find the best solution].'*

CBD revitalisation will help grow and maintain vibrant city centres as populations in the areas grow, but stakeholders reiterated that strategies for revitalising the CBD should not be considered in isolation from strategies for the region as a whole.

[12] See: http://renewnewcastle.org

Issues with existing public transport

Existing public transport faces several problems in the Lower Hunter region, namely that on one hand some modes are inconvenient or non-existent, while on the other some modes are at full capacity. For example, current timetabling makes it difficult for commuters to conveniently coordinate the arriveal of the busses and trains they catch and yet the train car parks are full at some regional areas.

In regards to Newcastle's public transport, one stakeholder was frustrated that despite '*most of the population increase [being] in infill areas*', and although the '*six kilometre radius from the CBD is viable for public transport*', '*there is no real imperative for people to use the public transport system at the moment*'. Buses were described as '*meandering*' and a slow way to get to a destination. It was believed that '*most people have a dreadful feeling of public transport*' and '*would not even consider using public transport*.' A lot of people in Newcastle '*don't have better than hourly frequency*' in public transport timetables. Some also felt that it's hard to increase public transport patronage '*when you can basically get a car park wherever you want*' in the CBD.

In more regional areas, there are also social issues '*at play which is why some people will not catch public transport.*' In some cases people will not catch public transport because of their opinions about the type of people that do catch public transport. One stakeholder described a perception in some areas that '*the people catching public transport are the kids who might not have good behaviour'* or that they belonged to lower socio-economic groups. This stakeholder felt that this perception is entrenched in those people who have been living here longer. '*If you lived and worked in Sydney and then moved here your attitude about public transport and riding public transport would be different.'*

Many stakeholders were adamant that public transport infrastructure and access must be increased to meet the demands of the current and growing population.

Issues with developing public transport

Stakeholders were concerned about the region's ability to develop both useful and used public transport at a pace to match the population growth. The main issues that stakeholders felt were thwarting the development of public transport infrastructure included the absence of a committed transport plan, the absence of an overarching governing body for transport, the short-term decision-making, and the dismissal of public transport by developers and others.

Several stakeholders were quite frustrated with the previous development of the Lower Hunter Regional Strategy. The Department of Planning set up a focus group, and a draft transport plan was completed, but it '*never saw the light of day'*. Now there is a push for a significant transport component in the Lower Hunter Regional Strategy review.

In terms of a leading agency, stakeholders felt positive about the creation of Transport for NSW, a new division of the NSW Government, and believed that they are '*quite aspirational in their goals*', but '*for too long it has been to splintered among groups like RTA and Railcorp*.'

> *'There is no governing body; we have a regional transport office, but it is maintenance more than planning and contracts for buses, more of a specialised area rather than a greater coordination for the area.'*

One stakeholder felt strongly that '*we need to get the politics out of it*'. Every decision is '*so short term*;' '*we need to ask ourselves, where do you want to be in 20 or 50 years and go back from there*.' Several stakeholders also felt that the state government could do more in terms of leading the way.

> *'State tells us that they will meet the demand for public transport, but the demand is very low. The strategy should be that we have to put in the public transport and then say to the community how wonderful the public transport is in order to shift that demand towards public transport. This culture won't change unless the state department starts leading.'*

Stakeholders also suggested that developers and local government need to change their strategy:

> *'The expectation from developers is that people will drive and we see the increases in congestion. In Maitland there is a real problem. From Maitland to Newcastle, the New England Highway over that stretch has pretty much reached its capacity in different segments … The car is king. Public transport is not taken into consideration by developers.'*

Other issues facing the development of public transport include a deficiency of funding, competition with other sectors, and prohibitive licensing procedures.

Several stakeholders pointed out that even though the regional plans that are now being developed, they '*will cost money, and there is no money to implement them*.' Particularly outside of Newcastle, there is a desire for more public transport and '*a lot of good infrastructure [needs to be put] in place'* to meet that demand, particularly with the corridors and rail lines, but until there is additional funding, it was believed that services could not be built.

In some regional areas the existing rail lines are not accessible. In these areas, there has been a long-time push to '*consider passenger rail, but we have this other issue – that it is the main coal freight lines for the port, so we suffer from these constraints*' of competition with other industry and it's therefore *'difficult for the transport authority'.*

Within Newcastle, '*there doesn't seem to be any additional money allocated for higher frequency of buses*' and '*if you get more frequency here that means someone else suffers*' because of the finite funding sources. Newcastle's infill is focused on the key transport corridor, but '*we need to get more money allocation from the state*.'

Stakeholders discussed the imperative to have the public transport in place before the new growth occurs, but in addition to funding, felt hindered by licensing approval by the state.

> *'Councils are now considering bus stops more. Each operator is licensed for a number of route kilometres. If you want to increase that you have to put it up to transport NSW and it doesn't happen. Suddenly you get a new suburb and you don't have any public transport. The stops should be in there before the people move in.'*

If the population moves in without public transport, '*people will move there with a car and get used to not having those services*' and it will become difficult to change behaviour towards public transport once the infrastructure is in place. Stakeholders believed the barriers to public transport must be addressed to sustainably meet the needs of the growing population.

Issues with developing active transport

Issues similar to those associated with developing public transport also hinder active transport development, and likewise stakeholders felt these barriers must be addressed to achieve a more sustainable development with population growth.

Although stakeholders are seeing a pro-cycling shift, there is a cultural resistance in some parts of the Lower Hunter. There is '*a perception here that bikes don't belong on the road'* and the safety of cyclists on the road is a concern. There are also infrastructure issues in that it is challenging to use bikes in conjunction with public transport on single trips. Provisioning is a challenge; that is, it is difficult '*to get all of the links together so there is a proper network*.' Several stakeholders stressed the need for active transport, as '*we are the obese capital*' and car-dependent development would only increase this health concern.

Car dependency

The lack of public and active transport options, compounded with population growth and other factors discussed here, has meant that the Lower Hunter is a '*hugely car dependent region*' with people in new suburbs driving '*out of the area every day to go to work and school*'. This confluence of factors has led to a sharp increase in traffic and congestion for the Lower Hunter. Stakeholders felt that compounding this is the problem that '*the expectation from developers is that people will drive*'. They also felt that the problem was exacerbated by the acute flow issues associated with large populations working the mines, and a dearth of proactive traffic management.

Many stakeholders noted that '*from Maitland to Newcastle, the New England Highway over that stretch has pretty much reached its capacity in different segments*' where '*two lights create a log jam in the morning and the evening*.' There are '*two bottlenecks in the Maitland area so people are sitting in traffic for a quarter of an hour*'. Stakeholders felt that '*something drastic needs to be done before the population compounds and it gets worse*'.

Stakeholders also mentioned the new Hunter Expressway, which is the '*upgrading of the highway to empty the four lane highway into Singleton*' and it was hoped that this would alleviate the traffic congestions, especially the mine-worker traffic. However, several stakeholders felt that the traffic congestion was due to local traffic and that a new expressway would actually do little to address the '*log jam'*, causing stakeholders to call for evidenced-based policy and action to meet the needs of population growth. Others felt frustrated with the delay in this project, mentioning that it had been promised to the region for almost 20 years and that the construction had started too late, raising concerns about how to prioritise infrastructure investment as population grows.

Housing affordability

Several stakeholders also mentioned the issues of 'sky-rocketing rent' and housing affordability both in rural and urban areas of the Lower Hunter.

> *'People are sleeping rough in the car; there was an injection of money into community homes through the stimulus package and that was a really nice time, because people could find housing. But now we are back to housing being the major issue.'*

> *'Housing affordability and supply is a growing issue. Just being able to find rental accommodation has been difficult in Newcastle.'*

One stakeholder felt that part of the reason for unaffordable housing is because developments are not matching the needs of the population.

> *'Housing is atrocious. We have some quite big developments that surround us but they are all three-bedroom brick homes that people are renting for $360 a week, which may be reasonable in certain areas but these are low socio-economic levels and the rental prices are drilling them into the ground.'*

Another stakeholder mentioned that for some of the new population there was a delay between moving to the area and experiencing financial hardship due to the hidden higher costs of living in an area without close proximity to services.

> *'A significant number of people who have moved to the area visit the community centre for help. It's after they have been here for year or so. It's after the honeymoon period of moving here ends … But after a time, they seek out this service because of the cost of living starts to become an issue.'*

While some stakeholders were concerned that affordable housing will continue to be an issue, others thought that there could potentially be an over-supply of housing in the future.

> *'What happens when all of the baby boomer housing comes on the market?'*

To increase housing affordability as the population grows, stakeholders were calling for evidence-based development of housing types and sizes based on the needs of the growing population, and for housing to be located next to services.

Challenges and issues of population growth in Lower Hunter

The Lower Hunter case study highlights the complexity and diversity of population growth challenges for a regional area containing five local governments.

The issues and challenges that emerged strongly from the stakeholder interviews and analysis of the documents were:

- land use tensions between residential, environment and employment sectors
- the need for liveable developments that are linked to integrated transport, land use, growth, infrastructure, water and biodiversity plans
- the need for economic diversification
- the need for trust and coordination between government agencies and in the planning process.

The Hunter region has a unique landscape characterised by the close proximity between communities, industrial developments, and coal transportation corridors. There was significant discussion with stakeholders about land use tensions within the Lower Hunter. Currently the proximity of industry to the residential and environmentally sensitive areas is creating negative stresses on population health, on environmental health and on other business sectors. Population growth is expected to exacerbate these land tensions if it is not planned properly. In particular, it appears likely that exposure to pollutants will remain an ongoing environmental challenge impacting upon a growing population.

Stakeholders were concerned that existing and new developments will not achieve appropriate or positive levels of liveability. There were concerns about the lack of public transport, community fragmentation, increased car dependence, increased traffic jams, lack of appropriate and affordable housing, and a serious deficit in access to medical services.

> *'Traditionally there has been poor infrastructure planning, with previous planning that has not tied planning into social services. People now don't want to drive but they have to, as they don't live where their jobs are. We still have to work out how to develop comprehensive planning to provide services and liveability to this growth.'*

Stakeholders strongly suggested that there is a need for regional, integrated modelling of the impacts of land use development. Many believed that development had occurred in unwise areas, including environmentally sensitive greenfield sites or areas of high risk (due to the likelihood of flooding or climate change-related impacts). Stakeholders believed that integrated land use plans would better balance the competing land use tensions and stressed that the integrated plans should be evidence-based and should preference areas that have already been cleared. They felt that new developments should have access to existing infrastructure, or failing this, that planning should ensure appropriate infrastructure is provided.

Several stakeholders felt that the mining boom was not going to provide long-term economic resiliency, and that economic diversification was going to be important for the Lower Hunter to meet the needs of its growing population and remain strong in the face of mining profitability fluctuations. In general stakeholders were positive about the prospects for economic diversification, but it was felt by many that the support was unfairly distributed between Sydney and Newcastle, and in turn, Newcastle and the other cities within the Lower Hunter.

To develop and effectively implement integrated land use plans, stakeholders felt that greater collaboration and transparency is needed across the multiple government agencies and institutes that are responsible for land use planning. As one of the stakeholders suggested, *'the region is experiencing growing pains'.* Overwhelmingly the stakeholders as a group recognised that if the region is going to continue to grow and align with a more sustainable development trajectory, then developments will need to be carried out within a more strategic and evidence-based planning framework as the '*growing pains'* being experienced under the current growth are many and varied.

Information gaps and opportunities

Stakeholders in the Lower Hunter were vocal about the indicator framework, with interviewees commenting on specific themes, indicators, and measures, and generally about indicator frameworks as a way of measuring sustainability. Some comments related to the usefulness, or lack thereof, of particular indicators:

> *'The extent of native vegetation cover is a really good indicator; growth economies like to gobble up that stuff.'*

> *'The number of endangered and vulnerable species listed is not a good indicator. An indicator about biodiversity conservation must be about management and extent of the hectares managed to conserve species population.'*

Other comments related suggestions for additional indicators, for example 'access to fresh food' and 'access to public social services'.

One stakeholder commented that the current indicators in the framework were measuring only what exists, and not what is planned. A dynamic and future-looking framework with indicators to measure what is planned, and therefore what is appropriate for the area, would be ideal.

Detailed analysis of data availability, gaps and possible alternative measures is provided in Tables 18–21 below.

A summary of theme and indicator data is provided in Tables 21–24.

Table 18: Natural Capital - data availability, gaps and alternative measures

Natural Capital				
Theme	**Indicator**	**Measure**	**Data availability at case study level**	**Alternative case study level measure (if applicable)**
Climate and atmosphere	1. Air quality	Number of days in year that key pollutants exceed national air quality standards	Available	Number days of exceedence for nitrogen dioxide (NO_2), ozone (0_3), sulphur dioxide ($S0_2$), CO and PM_{10}.
	2. GHG emissions	Net greenhouse gas emissions	Not available	No alternative measure available
		Greenhouse gas emissions per capita	Not available	No alternative measure available
	3. Energy usage	Residential and non-residential electricity use	Not available	Annual average household electricity consumption
Ecosystems and biodiversity	4. Terrestrial ecosystems	Extent of native vegetation	Available	n/a
		Extent and distribution of protected areas	Available	n/a
	5. Vulnerable and endangered species	Number of endangered species, population and communities listed under the *EPBC Act*	Available	n/a
	6. Reestablishment of local vegetation communities	Number of hectares under restoration by Council and volunteers	Not available	No alternative measure available
Water	7. Water consumption and availability	Water consumption (per capita)	Not available	Average residential water supplied per residential tenement
		Water availability to meet demand	Not available	Capacity of major sources
Land	8. Ground cover	Ground cover	Not available	Percentage of area vegetated
Waste	9. Waste disposed to landfill	Waste disposed to landfill	Available	Residual waste to landfill (tonnes)
	10. Recycling rates	Proportion of waste generated being recycled	Available	Total domestic recovery rate (%)

Table 19: Social and Human Capital - data availability, gaps and alternative measures

Social and Human Capital				
Theme	**Indicator**	**Measure**	**Data availability at case study level**	**Alternative case study level measure (if applicable)**
Skills and education	11. Educational attainment and qualification	Highest level of educational attainment	Available	n/a
	12. Education services	Ratio of childcare places to population of children aged 0-5 years resident in the LGA	Not available	No alternative measure available
		Ratio of primary school places to population of primary aged children resident in the LGA	Not available	No alternative measure available
Health	13. Self-reported health status	% reporting fair to poor health	Available	n/a
	14. Life expectancy	Life expectancy	Not available	No alternative measure available
	15. Persons who smoke daily	% of adults who are daily smokers	Available	n/a
	16. Obese persons	% of adults that are overweight or obese	Available	n/a
	17. Mental health	Proportions of adults rated as psychologically distress	Available	n/a
	18. Access to open space	Open space per capita	Available	n/a
Institutions and governance	19. Fair and functioning institutions and governance	Levels of trust in key institutions	Not available	No alternative measure available
	20. Community engagement	Proportion of people who volunteer	Available	n/a
Employment	21. Under-employment	Underemployment rate	Not available	Hours worked per week
	22. Unemployment	Unemployment rate	Available	n/a
	23. Local employment	% people working and living in the same LGA	Not available	Participation rate
Security	24. Security	Feelings of safety	Not available	No alternative measure available
		Incidence of personal and household crime	Available	n/a

Table 20: Economic Capital - data availability, gaps and alternative measures

Economic Capital				
Theme	**Indicator**	**Measure**	**Data availability at case study level**	**Alternative case study level measure (if applicable)**
Wealth	25.Household net wealth	Household net worth	Not available	Wealth per household
Housing	26.Housing supply gap	Net dwelling gap	Not available	Average dwelling price
	27.Housing affordability	Low income households in rental stress	Available	n/a
		Low income households in mortgage stress	Available	n/a
Transport and infrastructure	28.Mode of transport to work	Car as driver	Available	n/a
		Car as passenger	Available	n/a
		Public transport	Available	n/a
		Walking	Available	n/a
	29.Transport infrastructure	Kilometres of dedicated cycling paths	Not available	No alternative measure available
	30.Access to broadband internet	% households with broadband connection	Available	n/a
Income	31.Income disparity	Disparity in disposable household weekly income	Not available	Social security take-up; Household debt service ratio; Household debt to gross
Productivity and	32.Multifactor productivity	Multifactor productivity	Not available	No alternative measure available
	33.Innovation	Business with innovative activity	Not available	Patent counts per population
Socio-economic status	34.Relative socio-economic disadvantage	ABS Index of Relative Socioeconomic Disadvantage (IRSD) score	Available	n/a

Table 21: Contextual indicators - data availability, gaps and alternative measures

Contextual Indicators				
Theme	**Indicator**	**Measure**	**Data availability at case study level**	**Alternative case study level measure (if applicable)**
Population	35.Population size	Number of persons	Available	n/a
	36.Rate of growth	Annual rate of population growth	Available	n/a
	37.Population density	Number of persons per square kilometre	Available	n/a
	38.Gender and age profile	Gender and age profile	Available	n/a
Land use	39.Land use change	Rates of greenfield development	Not available	No alternative measure available
Cultural diversity	40.Proficiency in spoken English	% do not speak English well or not at all	Available	n/a
	41.Indigenous population	% indigenous	Available	n/a
	42.Country of birth	Country of birth	Available	n/a
Regional migration	43.Net overseas migration	Net overseas migration	Not available	No alternative measure available
	44.Overseas born	% born overseas	Available	n/a
	45.Domestic or internal migration	Net number of regional internal migrants	Available	n/a

Summary of theme and indicator data for Lower Hunter

Table 22: Natural capital - data figures

Natural capital						
Theme	**Indicator**	**Measure**	**Data**	**Frequency**	**Spatial resolution**	**Data source**
Climate and atmosphere	1. Air quality	Number days of exceedence for nitrogen dioxide (NO_2), ozone (O_3), sulphur dioxide (SO_2) and PM_{10}.	0 days for nitrogen dioxide (NO_2), ozone (O_3), sulphur dioxide (SO_2), carbon monoxide (CO) for 4th quarter 2007. 1 exceedence for PM_{10}.	Quarterly	Monitoring stations	NSW EPA
	2. GHG emissions	Net greenhouse gas emissions	Not available	n/a	n/a	n/a
		Greenhouse gas emissions per capita	Not available	n/a	n/a	n/a
	3. Energy usage	Annual average household electricity consumption	Hunter 5,792 kWh (2008), Gosford 6,626 kWh (2008) Sydney metro 7,654 kWh (2006)	Inconsistent (2006 & 2008)	Region	Origin Energy
Ecosystems and biodiversity	4. Terrestrial ecosystems	Extent of native vegetation	~23.5% of catchment retains vegetation of reasonable integrity	2003	Catchment - Hunter	Bushcare
		Extent and distribution of protected areas	Not available	n/a	n/a	n/a

	5. Vulnerable and endangered species	Number of endangered species, population and communities listed under the *EPBC Act*	Plants 7, Birds 2, Mammals 4, Frogs 2, Ecological communities 8	One off	Lower Hunter Valley	OEH
	6. Reestablishment of local of vegetation communities	Number of hectares under restoration by Council and volunteers	Not available	n/a	n/a	n/a
Water	7. Water consumption	Average residential water supplied per residential tenement	174.8 kl/annum, Decrease	Annual (2001-2011)	Hunter region	Hunter Water
		Capacity of major sources	288,000 ML, No increase or decrease	Annual (2006-2011)	Hunter region	Hunter Water
Land	8. Ground cover	Percentage of area vegetated	~60% or 264,000 hectares vegetated	One off	Lower Hunter	DPI
Waste	9. Waste disposed to landfill	Residual waste to landfill (tonnes)	Total domestic recovery: 187,131, Decrease Domestic kerbside recovery: 152,909, Increase	Annual (2005-2001)	Lower Hunter	OEH
	10. Recycling rates	Total domestic recovery rate (%)	Total domestic recovery: 30.0%, Increase Domestic kerbside recovery: 28.2%, Increase	Annual (2005-2001)	Lower Hunter	OEH

Table 23: Social and human capital - data figures

Social and human capital						
Theme	**Indicator**	**Measure**	**Data**	**Frequency**	**Spatial resolution**	**Data source**
Educational attainment	11. Educational attainment and qualification	% adults with tertiary qualifications	8.5% (2001), 12.9% (2011), Increase	5 years (Census)	LGA	ABS
		% adults with Certificate/ Adv Diploma	24.2% (2001), 28.7% (2011), Increase	5 years (Census)	LGA	ABS
	12. Education services	Ratio of childcare places to population of children aged 0-5 years resident in the LGA	Not available	n/a	n/a	n/a
		Ratio of primary school places to population of primary aged children resident in the LGA	Not available	n/a	n/a	n/a
Health	13. Self-reported health status	% reporting fair to poor health	15.1% (2007), NSW 12.7% (2007)	2004 & 2007	LGA	PHIDU, compiled from ABS & NHS data
	14. Life expectancy	Life expectancy	Not available	n/a	n/a	n/a
	15. Persons who smoke daily	% of adults who are daily smokers	17.0% (2007), NSW 15.3% (2007)	2004 & 2007	LGA	PHIDU, compiled from ABS & NHS data
	16. Obese persons	% of adults who are overweight or obese	39.0% (2007), NSW 37.0% (2007)	2004 & 2007	LGA	PHIDU, compiled from ABS & NHS data
	17. Mental health	% of adults rated as psychologically distress	10.0% (2007), NSW 9.3% (2007)	2004 & 2007	LGA	PHIDU, compiled from ABS & NHS data

	18. Access to open space	Open space per capita	Not available	n/a	n/a	n/a
Institutions and governance engagement	19. Fair and functioning institutions and governance	Levels of trust in key institutions	Not available	n/a	n/a	n/a
	20. Community engagement	% of volunteering	12.4% (2006), 14.0% (2011), Increase	5 years (Census)	LGA	ABS
Employment	21. Underemployment rate	Hours worked per week	24.0 hours (2011), +7.6% change from 2007	Annual	NIEIR region	SoR
	22. Unemployment rate	Unemployment rate	5.3% (2011), Greater Sydney 5.7% (2011), NSW 5.9% (2011)	5 years (Census)	LGA	ABS
	23. Local employment	Participation rate	59.4% (2011), Greater Sydney 61.7% (2011), NSW 59.6% (2011)	Monthly	DEEWR labour force region	DEEWR, Labour Force Region
Security	24. Security	Feelings of safety	Not available	n/a	n/a	n/a
		Incidence of reported crime	Lower Hunter high incidences of crimes compared to NSW except in three offences	Annual	Lower Hunter	BOCSAR

Table 24: Economic capital - data figures

Economic capital						
Theme	**Indicator**	**Measure**	**Data**	**Frequency**	**Spatial resolution**	**Data source**
Wealth	25. Household net wealth	Wealth per household	$371,00 (2001), $505,000 (2011), Increase	Annual	NIEIR region	SoR
Housing	26. Housing supply gap	Average dwelling price	$192,000 (2001), $333,600 (2011), Increase	Annual	NIEIR region	SoR
	27. Housing affordability	Low income households in rental stress	29.7% (2006), NSW 25.1% (2006)	5 years (Census)	LGA	PHIDU
		Low income households in mortgage stress	8.0% (2006), NSW 9.3% (2006)	5 years (Census)	LGA	PHIDU
Transport and infrastructure	28. Mode of transport to work	Car as driver	67.4% (2011)	5 years (Census)	LGA	ABS
		Car as passenger	6.1% (2011)	5 years (Census)	LGA	ABS
		Public transport	0.9% (2011))	5 years (Census)	LGA	ABS
		Walking	2.8% (2011)	5 years (Census)	LGA	ABS
	29. Transport infrastructure	Kilometres of dedicated cycling	Not available	n/a	n/a	n/a
	30. Access to broadband internet	% households with broadband	35.8% (2006), 73.3% (2011), Increase	5 years (Census)	LGA	ABS
Income	31. Income disparity	Social security take-up	14.6% (2011), 1.1% points decrease from 2007	Annual	NIEIR region	SoR
		Household debt service ratio	13% (2001), 17% (2011), Increase	Annual	NIEIR region	SoR

		Average dwelling price to household disposable income	2.6 (2001), 3.3 (2011), Increase	Annual	NIEIR region	SoR
Productivity and innovation	32. Multifactor productivity	Multifactor productivity	n/a	n/a	n/a	n/a
	33. Innovation	Patent counts per population	14.89 per 100,000 (1994-2011), national average 21.01	Annual	NIEIR region	SoR
Socio-economic status	34. Relative socio-economic disadvantage	ABS IRSD score	Cessnock 939, Lake Macquarie 996, Maitland 992, Newcastle 983, Port Stephens 986, Greater Sydney 1020, NSW 1000	5 years (Census)	LGA	ABS

Table 25: Contextual indicators - data figures

Contextual Indicators						
Theme	**Indicator**	**Measure**	**Data**	**Frequency**	**Spatial resolution**	**Data source**
Population	35. Population size	Number of persons	142,101 (2001), 154,896 (2011), Increase	Annual	LGA	ABS
	36. Rate of growth	Annual rate of population growth	Average 1.9% per annum 2001-2011	Annual	LGA	ABS
	37. Population density	Number of persons per square kilometre	114.8 (2001), 125.8 (2011), Increase	Annual	LGA	ABS
	38. Gender and age profile	Gender and age profile	See Figure 4	5 years	LGA	ABS
Land use	39. Land use change	% infill development	Not available	n/a	n/a	n/a
		% greenfield development	Not available	n/a	n/a	n/a
Cultural diversity	40. Proficiency in spoken English	% do not speak English well or not at all	0.8% (2001), 0.7% (2011), Increase	5 years	LGA	ABS
	41. Indigenous population	% indigenous	2.4% (2001), 3.2% (2011), Increase	5 years	LGA	ABS
	42. Country of birth	Country of birth	See Table 26	5 years	LGA	ABS
Regional migration	43. Net overseas migration	Net overseas migration	Not available	n/a	n/a	n/a
	44. Overseas born	% born overseas	15.3% in 2001, 15.0% in 2011	5 years	LGA	ABS
	45. Domestic or internal migration	Net number of regional internal migrants	2006-11: +9,785[13]	Annual (2006-2010)	LGA	ABS

[13] ABS (cat. no. 3412.0) Migration, Australia, 2010-11 experimental regional internal migration estimates.

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Appendix

Table 26: Contextual indicators - country of birth

Country of birth	2001	2011	Percentage point change 2001-2010
Australia	85.5%	85.2%	-0.3%
Bosnia and Herzegovina	0.1%	0.0%	0.0%
Cambodia	0.0%	0.0%	0.0%
Canada	0.1%	0.1%	0.0%
China (excl. SARs and Taiwan)	0.2%	0.3%	0.1%
Croatia	0.1%	0.1%	0.0%
Egypt	0.0%	0.0%	0.0%
Fiji	0.1%	0.1%	0.0%
Former Yugoslav Republic of Macedonia	0.2%	0.2%	-0.1%
Germany	0.5%	0.4%	-0.1%
Greece	0.2%	0.1%	0.0%
Hong Kong (SAR of China)	0.1%	0.1%	0.0%
India	0.1%	0.3%	0.2%
Indonesia	0.1%	0.1%	0.0%
Iraq	0.0%	0.0%	0.0%
Ireland	0.1%	0.2%	0.0%
Italy	0.3%	0.3%	-0.1%
Japan	0.0%	0.0%	0.0%
Korea, Republic of (South)	0.1%	0.1%	0.1%
Lebanon	0.0%	0.0%	0.0%
Malaysia	0.1%	0.2%	0.0%
Malta	0.1%	0.1%	0.0%
Netherlands	0.3%	0.3%	0.0%
New Zealand	0.9%	1.1%	0.1%
Philippines	0.3%	0.3%	0.1%
Poland	0.2%	0.1%	-0.1%
Singapore	0.0%	0.0%	0.0%
South Africa	0.2%	0.3%	0.1%
South Eastern Europe	0.2%	0.1%	-0.1%
Sri Lanka	0.1%	0.1%	0.0%
Thailand	0.0%	0.1%	0.0%
Turkey	0.0%	0.0%	0.0%
United Kingdom, Channel Islands and Isle of Man	3.5%	3.2%	-0.3%
United States of America	0.2%	0.3%	0.1%
Vietnam	0.1%	0.1%	0.0%
Born elsewhere	1.2%	1.5%	0.3%
Country of birth not stated	5.0%	4.7%	-0.3%